

Test oil:
ISO 4113 od
SAE J967d

ZEXEL - Test values
Distributor pumps
Engine: NEW HA

BOSCH no. 9 460 610 295
DKKC no. 104740-0097
Date: 15.4.1988 (0)
Company: MAZDA
No: SE01 13 800E

Injection pump no. 104640-0096 (NP-VE4/10F1900RNP51)

Direction of rotation: rear end side clockwise

Prestroke setting: 0.18 - 0.22 mm

Test-nozzle holder combination: 1 688 901 000 Test pressure line: 1 680 750 017

1. Setting values		Speed min-1	Setting values	Charge - air pressure - bar (mmHg)	Difference (cc)
1-1	Timing device travel	1500	5.8 - 6.2 (mm)		
1-2	Feed pump pressure	1500	5.7 - 6.3 (kg/cm ²)		
1-3	Full load delivery without charge-air pressure	1000	53.1 - 54.1 (cc/1000 strokes)		3.5
	Full load delivery with charge-air pressure		(cc/1000 strokes)		
1-4	Low-idle speed regulation	300	10.8 - 14.8 (cc/1000 strokes)		2.5
1-5	Start	100	over 78.0 (cc/1000 strokes)		
1-6	Maximum speed regulation	2100	19.1 - 25.1 (cc/1000 strokes)		
1-7	Load-dependent start of delivery				
1-8					

2. Test values

2-1	Timing device	N = min-1 mm	1000 2.4 - 3.6	1500 5.7 - 6.3	1900 7.6 - 8.8
2-2	Feed pump	N = min-1 kg/cm ²	500 2.3 - 2.9	1500 5.7 - 6.3	1900 7.1 - 7.7
2-3	Overflow rate	N = min-1 cc/10s	1000 5.3 - 97.0		
2-4	Delivery rates				
	Control lever position	Speed min-1	Delivery rate (cc/1000 strokes)	Charge-air pressure bar (mmHg)	Difference (cc)
	End stop	1000	52.6 - 54.6		
		500	45.6 - 49.6		
		1500	50.3 - 54.3		
		2100	19.1 - 25.1		
		2200	below 6		
	Shut-off	300	0		
	Idle stop	300	10.8 - 14.8		
		below 570	0		
2-5	Magnet	Cut-in voltage max. 16 V Test voltage 24 - 26 V			

3. Dimensions

K	3.2 - 3.4 mm
KF	5.7 - 5.9 mm
MS	1.7 - 1.9 mm
LDA	-

Angle of control lever

α	18.0 - 22.0 angle
A	5.7 - 8.3 mm
β	35.0 - 45.0 angle
B	11.2 - 14.5 mm
Y	- angle
C	- mm

A1

Test values

ZEXEL-Distributor pumps



A2

Test values

ZEXEL-Distributor pumps



Test oil:
ISO 4113 od
SAE 3967d

ZEXEL - Test values
Distributor pumps
Engine: XA

BOSCH no. 9 460 610 293
DKKC no. 104740-0153
Date: 15.4.1988 (0)
Company: MAZDA
No: 4827 13 800B

Injection pump no. 104640-0153 (NP-VE4/8F1300RNP130)

Direction of rotation: rear end side clockwise

Prestroke setting: - mm Test-nozzle holder combination: 1 688 901 000 Test pressure line: 1 680 750 017

1. Setting values		Speed min-1	Setting values	Charge - air pressure - bar (mmHg)	Difference (cc)
1-1	Timing device travel	1000	2,3 - 2,7 (mm)		
1-2	Feed pump pressure	1000	4,0 - 4,6 (kg/cm ²)		
1-3	Full load delivery without charge-air pressure	1000	44,3 - 45,3 (cc/1000 strokes)		3,0
	Full load delivery with charge-air pressure		(cc/1000 strokes)		
1-4	Low-idle speed regulation	350	4,2 - 8,2 (cc/1000 strokes)		2,0
1-5	Start	100	over 78,0 (cc/1000 strokes)		
1-6	Maximum speed regulation	1380	12,1 - 18,1 (cc/1000 strokes)		
1-7	Load-dependent start of delivery				
1-8					

2. Test values

2-1	Timing device	N = min-1 mm	1000 2,2 - 2,8	1300 3,7 - 4,9	
2-2	Feed pump	N = min-1 kg/cm ²	500 2,2 - 2,8	1000 4,0 - 4,6	1300 5,1 - 5,7
2-3	Overflow rate	N = min-1 cc/10s	1000 54,0 - 98,0		
2-4 Delivery rates					
Control lever position		Speed min-1	Delivery rate (cc/1000 strokes)	Charge-air pressure bar (mmHg)	Difference (cc)
End stop		1000	43,8 - 45,8		
		500	37,5 - 41,5		
		1300	44,7 - 48,7		
		1380	12,1 - 18,1		
		1440	below 4,0		
Shut-off		350	0		
Idle stop		350	4,2 - 8,2		
		500	0		
2-5 Magnet		Cut-in voltage max. 8 V Test voltage 12 - 14 V			

3. Dimensions

K	3,2 - 3,4 mm
KF	5,7 - 5,9 mm
MS	1,5 - 1,7 mm
LDA	-

Angle of control lever

α	9,0 - 17,0 angle
A	2,5 - 7,7 mm
β	36,0 - 46,0 angle
B	11,4 - 15,0 mm
Y	- angle
C	- mm

A3

Test values

ZEXEL-Distributor pumps



A4

Test values

ZEXEL-Distributor pumps



Test oil:
ISO 4113 od
SAE J967d

ZEXEL - Test values
Distributor pumps
Engine: 4D56

1/3
BOSCH no. 9 460 610 296
DKKC no. 104740-3612
Date: 15.4.1988 (0)
Company: MITSUBISHI
No: MD 103210

Injection pump no. 104640-3332

(NP-VE4/10F2100RNP433)

Direction of rotation: rear end side clockwise

Prestroke setting: - mm

Test-nozzle holder combination: 1 688 901 000 Test pressure line: 1 680 750 017

1. Setting values		Speed min-1	Setting values	Charge - air pressure - bar (mmHg)	Difference (cc)
1-1	Timing device travel	1250	T=3,5 - 3,9 (mm)		
1-2	Feed pump pressure	1250	4,5 - 5,1 (kg/cm ²)		
1-3	Full load delivery without charge-air pressure	1250	45,3 - 46,3 (cc/1000 strokes)		3,0
	Full load delivery with charge-air pressure		(cc/1000 strokes)		
1-4	Low-idle speed regulation	375	6,5 - 9,5 (cc/1000 strokes)		2,0
1-5	Start	100	63,0 - 83,0 (cc/1000 strokes)		
1-6	Maximum speed regulation	2550	15,1 - 21,1 (cc/1000 strokes)		4,0
1-7	Load-dependent start of delivery	1250	T=0,6 ± 0,2 (mm)		
1-8					

2. Test values

2-1	Timing device	N = min-1 mm	500 0,6 - 1,8	750 1,4 - 2,6	1250 3,3 - 4,1	2100 6,6 - 7,8
2-2	Feed pump	N = min-1 kg/cm ²	600 2,9 - 3,5	1250 4,5 - 5,1	2100 6,5 - 7,1	
2-3	Overflow rate	N = min-1 cc/10s	1250 48,0-92,0			
2-4 Delivery rates						
Control lever position		Speed min-1	Delivery rate (cc/1000 strokes)	Charge-air pressure bar (mmHg)		Difference (cc)
End stop		1250	44,8 - 46,8			
		600	42,3 - 46,3			
		2100	37,2 - 41,2			
		2550	13,1 - 23,1			
		2900	below 5,0			
Shut-off		375	0			
Idle stop		600	below 3,0			
		375	6,0 - 10,0			
2-5 Magnet		Cut-in voltage max. 8 V Test voltage 12 - 14 V				

3. Dimensions

K	3,2 - 3,4 mm
KF	5,7 - 5,9 mm
MS	1,1 - 1,3 mm
LDA	-

Angle of control lever

α	55,0 - 63,0 angle
A	10,5 - 16,0 mm
β	41,0 - 51,0 angle
B	12,5 - 16,5 mm
Y	- angle
C	- mm

A5

Test values

ZEXEL-Distributor pumps



A6

Test values

ZEXEL-Distributor pumps



● SETTING LOAD-DEPENDENT START OF DELIVERY

104740-3612

2/3

1. To set

(1) Stop the control lever at the appropriate spot in accordance with the following conditions.

Charge-air pressure: - mmHg
 Pump speed: 1250 /min
 Injection quantity: $35.7 \pm 0.5 \text{ cm}^3/1000 \text{ strokes}$

(2) When the control lever is in the position specified above (1), adjust the governor sleeve so that the timing device travel is as previously stipulated.

2. Checking load-dependent start of delivery

Stop the control lever at the appropriate spot in accordance with the following conditions, and check load-dependent start of delivery.

Position of control lever			Prescribed values	
Pump speed (1/min)	Injection quantity ($\text{cm}^3/1000 \text{ strokes}$)	Charge-air pressure (mmHg)	Timing device travel (mm)	Reduction of timing device travel (mm)
1250	34.7 - 36.7	-	(3.1)	0.2 - 1.0
1250	26.7 - 29.7	-	(2.3)	0.8 - 2.0

A7

Test values

ZEXEL-Distributor pumps



A8

Test values

ZEXEL-Distributor pumps



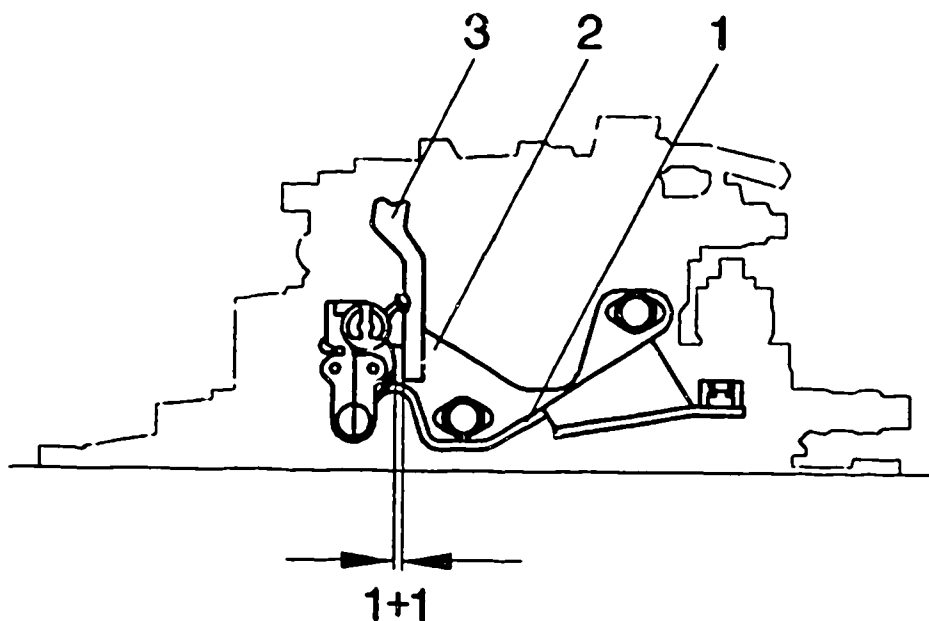


Fig. 1

104740-3612 3/3

- 1 = bracket
- 2 = M-FICD lever
- 3 = control lever

● SETTING THE FICD INSTALLATION POSITION

1. Maintain control lever in the idle position.
2. Set FICD bracket in such a way that the gap dimension between the control lever and the FICD lever equals 1+1 mm.



Test oil:
ISO 4113 od
SAE J967d

ZEXEL - Test values
Distributor pumps
Engine: 4D56

1/2
BOSCH no. 9 460 610 297
DKKC no. 104740-3632
Date: 15.4.1988 (0)
Company: MITSUBISHI
No: MD 103206

Injection pump no. 104640-3342 (NP-VE4/10F2100RNP432)

Direction of rotation: rear end side clockwise

Prestroke setting: - mm

Test-nozzle holder combination: 1 688 901 000 Test pressure line: 1 680 750 017

1. Setting values		Speed min-1	Setting values	Charge - air pressure - bar (mmHg)	Difference (cc)
1-1	Timing device travel	1250	T=3,5 - 3,9 (mm)		
1-2	Feed pump pressure	1250	4,5 - 5,1 (kg/cm ²)		
1-3	Full load delivery without charge-air pressure	1250	45,3 - 46,3 (cc/1000 strokes)		3,0
	Full load delivery with charge-air pressure		(cc/1000 strokes)		
1-4	Low-idle speed regulation	375	6,5 - 9,5 (cc/1000 strokes)		2,0
1-5	Start	100	63,0 - 83,0 (cc/1000 strokes)		
1-6	Maximum speed regulation	2550	15,1 - 21,1 (cc/1000 strokes)		4,0
1-7	Load-dependent start of delivery	1250	T - 0,6 ± 0,2 (mm)		
1-8					

2. Test values

2-1	Timing device	N = min-1 mm	500 0,6 - 1,8	750 1,4 - 2,6	1250 3,3 - 4,1	2100 6,6 - 7,8
2-2	Feed pump	N = min-1 kg/cm ²	600 2,9 - 3,5	1250 4,5 - 5,1	2100 6,5 - 7,1	
2-3	Overflow rate	N = min-1 cc/10s	1250 48,0-92,0			

2-4 Delivery rates

Control lever position	Speed min-1	Delivery rate (cc/1000 strokes)	Charge-air pressure bar (mmHg)	Difference (cc)
End stop	1250	44,8 - 46,8		
	600	42,3 - 46,3		
	2100	37,2 - 41,2		
	2550	13,1 - 23,1		
	2900	below 5,0		
Shut-off	375	0		
Idle stop	600	below 3,0		
	375	6,0 - 10,0		

2-5
Magnet Cut-in voltage max. 8 V
Test voltage 12 - 14 V

3. Dimensions

K 3,2 - 3,4 mm
KF 5,7 - 5,9 mm
MS 1,1 - 1,3 mm
LDA -

Angle of control lever

α 55,0 - 63,0 angle
A 10,5 - 16,0 mm
β 41,0 - 51,0 angle
B 12,5 - 16,5 mm
γ - angle
C - mm

A10

Test values

ZEXEL-Distributor pumps



A11

Test values

ZEXEL-Distributor pumps



● SETTING LOAD-DEPENDENT START OF DELIVERY

104740-3632

2/2

1. To set

(1) Stop the control lever at the appropriate spot in accordance with the following conditions.

Charge-air pressure: - mmHg
 Pump speed: 1250 /min
 Injection quantity: $35,7 \pm 0,5 \text{ cm}^3/1000 \text{ strokes}$

(2) When the control lever is in the position specified above (1), adjust the governor sleeve so that the timing device travel is as previously stipulated.

2. Checking load-dependent start of delivery

Stop the control lever at the appropriate spot in accordance with the following conditions, and check load-dependent start of delivery.

Position of control lever			Prescribed values	
Pump speed (1/min)	Injection quantity ($\text{cm}^3/1000 \text{ strokes}$)	Charge-air pressure (mmHg)	Timing device travel (mm)	Reduction of timing device travel (mm)
1250	34,7 - 36,7	-	(3,1)	0,2 - 1,0
1250	26,7 - 29,7	-	(2,3)	0,8 - 2,0

A12

Test values

ZEXEL-Distributor pumps



A13

Test values

ZEXEL-Distributor pumps



Test oil:
ISO 4113 od
SAE J967d

ZEXEL - Test values
Distributor pumps
Engine: 4D56

1/3

BOSCH no. 9 460 610 298
DKKC no. 104740-3642
Date: 15.4.1988 (0)
Company: MITSUBISHI
No: MD 103207

Injection pump no. 104640-3352

(NP-VE4/10F2100RNP430)

Direction of rotation: rear end side clockwise

Prestroke setting: - mm

Test-nozzle holder combination: 1 688 901 000 Test pressure line: 1 680 750 017

1. Setting values		Speed min-1	Setting values	Charge - air pressure - bar (mmHg)	Difference (cc)
1-1	Timing device travel	1250	T=3,5 - 3,9 (mm)	540 - 560	
1-2	Feed pump pressure	1250	4,5 - 5,1 (kg/cm ²)	540 - 560	
1-3	Full load delivery without charge-air pressure	1250	61,4 - 62,4 (cc/1000 strokes)	540 - 560	4,5
	Full load delivery with charge-air pressure	750	60,4 - 61,4 (cc/1000 strokes)	320 - 340	
1-4	Low-idle speed regulation	375	6,5 - 9,5 (cc/1000 strokes)		2,0
1-5	Start	100	63,0 - 83,0 (cc/1000 strokes)		
1-6	Maximum speed regulation	2650	22,2 - 28,2 (cc/1000 strokes)	540 - 560	5,5
1-7	Load-dependent start of delivery	1250	T-0,6 ± 0,2 (mm)	540 - 560	
1-8					

2. Test values

2-1	Timing device	N = min-1 mm	500 0,6 - 1,8	750 1,4 - 2,6	1250 3,3 - 4,1	2100 6,6 - 7,8
2-2	Feed pump	N = min-1 kg/cm ²	600 2,9 - 3,5	1250 4,5 - 5,1	2100 6,5 - 7,1	
2-3	Overflow rate	N = min-1 cc/10s	1250 48,0-92,0			

2-4 Delivery rates

Control lever position	Speed min-1	Delivery rate (cc/1000 strokes)	Charge-air pressure bar (mmHg)	Difference (cc)
End stop	1250	60,9 - 62,9	540 - 560	
	600	45,8 - 50,8	0	
	750	59,9 - 61,9	320 - 340	
	2100	52,8 - 57,8	540 - 560	
	2650	20,2 - 30,2	540 - 560	
	3050	below 5,0	540 - 560	
Shut-off	375	0	0	
Idle stop	600	below 3,0	0	
	375	6,0 - 10,0	0	

2-5
Magnet Cut-in voltage max. 8 V
Test voltage 12 - 14 V

3. Dimensions

K	3,2 - 3,4 mm
KF	5,7 - 5,9 mm
MS	0,9 - 1,1 mm
LDA	3,6 - 3,8 mm

Angle of control lever

α	55,0 - 63,0 angle
A	10,5 - 16,0 mm
β	40,0 - 50,0 angle
B	12,1 - 16,1 mm
γ	- angle
C	- mm

A14

Test values

ZEXEL-Distributor pumps



A15

Test values

ZEXEL-Distributor pumps



Note:

- After setting the full-load at 1250/min, adjust the full-load from 750/min and the accelerator pressure from 0.45 kg/cm² to 330 mmHg, and then regulate the injection quantity with the accelerator-adjustment screw.

Note:

- Setting the timing device stroke:

Fix LDA at 550 mmHg (0.75 kg/cm²)

and put control lever in the full-load delivery position, then set timing device stroke.



● SETTING LOAD-DEPENDENT START OF DELIVERY

104740-3642 3/3

1. To set

(1) Stop the control lever at the appropriate spot in accordance with the following conditions.

Charge-air pressure: 540 - 560 mmHg
 Pump speed: 1250 /min
 Injection quantity: 50,3 ± 0,5 cm³/1000 strokes

(2) When the control lever is in the position specified above (1), adjust the governor sleeve so that the timing device travel is as previously stipulated.

2. Checking load-dependent start of delivery

Stop the control lever at the appropriate spot in accordance with the following conditions, and check load-dependent start of delivery.

Position of control lever			Prescribed values	
Pump speed (1/min)	Injection quantity (cm ³ /1000 strokes)	Charge-air pressure (mmHg)	Timing device travel (mm)	Reduction of timing device travel (mm)
1250	49,3 - 51,3	540 - 560	(3,1)	0,2 - 1,0
1250	38,7 - 41,7	540 - 560	(2,3)	0,8 - 2,0

A17

Test values

ZEXEL-Distributor pumps



A18

Test values

ZEXEL-Distributor pumps



Test oil:
ISO 4113 od
SAE J967d

ZEXEL - Test values
Distributor pumps
Engine: 4D56

1/3

BOSCH no. 9 460 610 289
DKKC no. 104740-3652
Date: 15.4.1988 (0)
Company: MITSUBISHI
No: MD 103208

Injection pump no. 104640-3352

(NP-VE4/10F2100RNP430)

Direction of rotation: rear end side clockwise

Prestroke setting: - mm

Test-nozzle holder combination: 1 688 901 000 Test pressure line: 1 680 750 017

1. Setting values		Speed min-1	Setting values	Charge - air pressure - bar (mmHg)	Difference (cc)
1-1	Timing device travel	1250	T = 3,5 - 3,9 (mm)	540 - 560	
1-2	Feed pump pressure	1250	4,5 - 5,1 (kg/cm ²)	540 - 560	
1-3	Full load delivery without charge-air pressure	1250	61,4 - 62,4 (cc/1000 strokes)	540 - 560	4,5
	Full load delivery with charge-air pressure	750	60,4 - 61,4 (cc/1000 strokes)	320 - 340	
1-4	Low-idle speed regulation	375	6,5 - 9,5 (cc/1000 strokes)		2,0
1-5	Start	100	63,0 - 83,0 (cc/1000 strokes)		
1-6	Maximum speed regulation	2650	22,2 - 28,2 (cc/1000 strokes)	540 - 560	5,5
1-7	Load-dependent start of delivery	1250	T = 0,6 ± 0,2 (mm)		
1-8					

2. Test values

2-1	Timing device	N = min-1 mm	500 0,6 - 1,8	750 1,4 - 2,6	1250 3,3 - 4,1	2100 6,6 - 7,8
2-2	Feed pump	N = min-1 kg/cm ²	600 2,9 - 3,5	1250 4,5 - 5,1	2100 6,5 - 7,1	
2-3	Overflow rate	N = min-1 cc/10s	1250 48,0-92,0			
2-4 Delivery rates						
Control lever position		Speed min-1	Delivery rate (cc/1000 strokes)	Charge-air pressure bar (mmHg)		Difference (cc)
End stop		1250	60,9 - 62,9	540 - 560		
		600	45,8 - 50,8	0		
		750	59,9 - 61,9	320 - 340		
		2100	52,8 - 57,8	540 - 560		
		2650	20,2 - 30,2	540 - 560		
		3050	below 5,0	540 - 560		
Shut-off		375	0			
Idle stop		600	below 3,0	0		
		375	6,0 - 10,0	0		
2-5 Magnet		Cut-in voltage max. 8 V Test voltage 12 - 14 V				

3. Dimensions

K	3,2 - 3,4	mm
KF	5,7 - 5,9	mm
MS	0,9 - 1,1	mm
LDA	3,6 - 3,8	mm

Angle of control lever

α	55,0 - 63,0	angle
A	10,5 - 16,0	mm
β	40,0 - 50,0	angle
B	12,1 - 16,1	mm
Y	-	angle
C	-	mm

A19

Test values

ZEXEL-Distributor pumps



A20

Test values

ZEXEL-Distributor pumps



Note:

- After setting the full-load at 1250/min, adjust the full-load from 750/min and the accelerator pressure from 0.45 kg/cm² to 330 mmHg, and then regulate the injection quantity with the accelerator-adjustment screw.

Note:

- Setting the timing device stroke:

Fix LDA at 550 mmHg (0.75 kg/cm²)

and put control lever in the full-load delivery position, then set timing device stroke.



1. To set

(1) Stop the control lever at the appropriate spot in accordance with the following conditions.

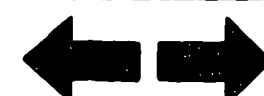
Charge-air pressure: 540 - 560 mmHg
 Pump speed: 1250 /min
 Injection quantity: 50,3 ± 0,5 cm³/1000 strokes

(2) When the control lever is in the position specified above (1), adjust the governor sleeve so that the timing device travel is as previously stipulated.

2. Checking load-dependent start of delivery

Stop the control lever at the appropriate spot in accordance with the following conditions, and check load-dependent start of delivery.

Position of control lever			Prescribed values	
Pump speed (1/min)	Injection quantity (cm ³ /1000 strokes)	Charge-air pressure (mmHg)	Timing device travel (mm)	Reduction of timing device travel (mm)
1250	49,3 - 51,3	540 - 560	(3,1)	0,2 - 1,0
1250	38,7 - 41,7	540 - 560	(2,3)	0,8 - 2,0



Test oil:
ISO 4113 od
SAE J967d

ZEXEL - Test values
Distributor pumps
Engine: 4D56T

1/4

BOSCH no. 9 460 610 299
DKKC no. 104740-3662
Date: 15.4.1988 (0)
Company: MITSUBISHI
No: MD 103209

Injection pump no. 104640-3362

(NP-VE4/10F2100RNP431)

Direction of rotation: rear end side clockwise

Prestroke setting: - mm

Test-nozzle holder combination: 1 688 901 000 Test pressure line: 1 680 750 017

1. Setting values		Speed min-1	Setting values	Charge - air pressure - bar (mmHg)	Difference (cc)
1-1	Timing device travel	1250	T = 3,5 - 3,9 (mm)	540 - 560	
1-2	Feed pump pressure	1250	4,5 - 5,1 (kg/cm ²)	540 - 560	
1-3	Full load delivery without charge-air pressure	1250	61,4 - 62,4 (cc/1000 strokes)	540 - 560	4,5
	Full load delivery with charge-air pressure	750	60,4 - 61,4 (cc/1000 strokes)	320 - 340	
1-4	Low-idle speed regulation	375	6,5 - 9,5 (cc/1000 strokes)	0	2,0
1-5	Start	100	63,0 - 83,0 (cc/1000 strokes)	0	
1-6	Maximum speed regulation	2650	22,2 - 28,2 (cc/1000 strokes)	540 - 560	5,5
1-7	Load-dependent start of delivery	1250	T = 0,6 ± 0,2 (mm)	540 - 560	
1-8					

2. Test values

2-1	Timing device	N = min-1 mm	500 0,6 - 1,8	750 1,4 - 2,6	1250 3,3 - 4,1	2100 6,6 - 7,8
2-2	Feed pump	N = min-1 kg/cm ²	600 2,9 - 3,5	1250 4,5 - 5,1	2100 6,5 - 7,1	
2-3	Overflow rate	N = min-1 cc/10s	1250 48,0-92,0			
2-4 Delivery rates						
Control lever position		Speed min-1	Delivery rate (cc/1000 strokes)	Charge-air pressure bar (mmHg)	Difference (cc)	
End stop		1250	60,9 - 62,9	540 - 560		
		600	45,8 - 50,8	0		
		750	59,9 - 61,9	320 - 340		
		2100	52,8 - 57,8	540 - 560		
		2650	20,2 - 30,2	540 - 560		
		3050	below 5,0	540 - 560		
Shut-off		375	0	0		
Idle stop		600	below 3,0	0		
		375	6,0 - 10,0	0		
2-5 Magnet		Cut-in voltage max. 8 V Test voltage 12 - 14 V				

3. Dimensions

K	3,2 - 3,4	mm
KF	5,7 - 5,9	mm
MS	0,9 - 1,1	mm
LDA	3,6 - 3,8	mm

Angle of control lever

α	55,0 - 63,0	angle
A	10,5 - 16,0	mm
β	40,0 - 50,0	angle
B	12,1 - 16,1	mm
Y	-	angle
C	-	mm

B1

Test values

ZEXEL-Distributor pumps



B2

Test values

ZEXEL-Distributor pumps



Note:

- After setting the full-load at 1250/min, adjust the full-load from 750/min and the accelerator pressure from 0.45 kg/cm² to 330 mmHg, and then regulate the injection quantity with the accelerator-adjustment screw.

Note:

- Setting the timing device stroke:

Fix LDA at 550 mmHg (0.75 kg/cm²)

and put control lever in the full-load delivery position, then set timing device stroke.



1. To set

(1) Stop the control lever at the appropriate spot in accordance with the following conditions.

Charge-air pressure: 540 - 560 mmHg
 Pump speed: 1250 /min
 Injection quantity: 50,3 ± 0,5 cm³/1000 strokes

(2) When the control lever is in the position specified above (1), adjust the governor sleeve so that the timing device travel is as previously stipulated.

2. Checking load-dependent start of delivery

Stop the control lever at the appropriate spot in accordance with the following conditions, and check load-dependent start of delivery.

Position of control lever			Prescribed values	
Pump speed (1/min)	Injection quantity (cm ³ /1000 strokes)	Charge-air pressure (mmHg)	Timing device travel (mm)	Reduction of timing device travel (mm)
1250	49,3 - 51,3	540 - 560	(3,1)	0,2 - 1,0
1250	38,7 - 41,7	540 - 560	(2,3)	0,8 - 2,0

B4

Test values

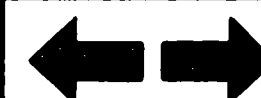
ZEXEL-Distributor pumps



B5

Test values

ZEXEL-Distributor pumps



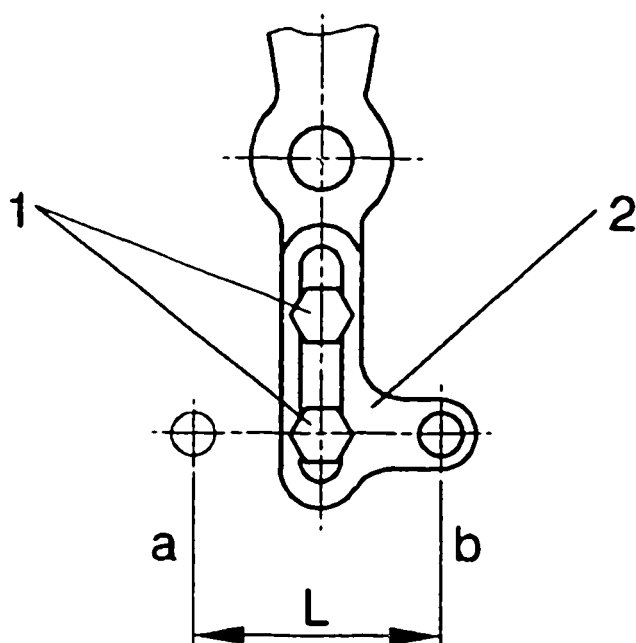


Fig. 2

104740-3662 4/4

1 = screw
2 = A/T lever

a = full-load
b = idle

● SETTING A/T CONNECTING LEVER

1. Turn control lever from the idle position to full-load position, and check that the travel (L) of the A/T lever equals

$32.9 \pm 1 \text{ mm.}$

2. When the measurement L is not as prescribed, loosen the screw and adjust the A/T lever.
3. Following adjustment, tighten screw.

B6

Test values

ZEXEL-Distributor pumps



Test oil:
ISO 4113 od
SAE J967d

ZEXEL - Test values
Distributor pumps
Engine: 4D56

1/3
BOSCH no. 9 460 610 300
DKKC no. 104740-3672
Date: 15.4.1988 (0)
Company: MITSUBISHI
No: MD 106444

Injection pump no. 104640-3372

(NP-VE4/10F2100RNP460)

Direction of rotation: rear end side clockwise

Prestroke setting: - mm

Test-nozzle holder combination: 1 688 901 000 Test pressure line: 1 680 750 017

1. Setting values		Speed min-1	Setting values	Charge - air pressure - bar (mmHg)	Difference (cc)
1-1	Timing device travel	1250	T=3,5 - 3,9 (mm) 4,5 - 5,1 (kg/cm ²)		3,0
1-2	Feed pump pressure	1250			
1-3	Full load delivery without charge-air pressure Full load delivery with charge-air pressure	1250			
1-4	Low-idle speed regulation	375	45,3 - 46,3 (cc/1000 strokes)		
1-5	Start	100	(cc/1000 strokes) 6,5 - 9,5 (cc/1000 strokes)		2,0
1-6	Maximum speed regulation	2550	63,0 - 83,0 (cc/1000 strokes)		
1-7	Load-dependent start of delivery	1250	15,1 - 21,1 (cc/1000 strokes)		4,0
1-8			T - 0,4 ± 0,8 (mm)		

2. Test values

2-1	Timing device	N = min-1 mm	500 0,6 - 1,8	750 1,4 - 2,6	1250 3,3 - 4,1	2100 6,6 - 7,8
2-2	Feed pump	N = min-1 kg/cm ²	600 2,9 - 3,5	1250 4,5 - 5,1	2100 6,5 - 7,1	
2-3	Overflow rate	N = min-1 cc/10s	1250 48,0-92,0			

2-4 Delivery rates

Control lever position	Speed min-1	Delivery rate (cc/1000 strokes)	Charge-air pressure bar (mmHg)	Difference (cc)
End stop	1250	44,8 - 46,8		
	600	42,3 - 46,3		
	2100	37,2 - 41,2		
	2550	13,1 - 23,1		
	2900	below 5,0		
Shut-off	375	0		
Idle stop	600	below 3,0		
	375	6,0 - 10,0		

2-5
Magnet Cut-in voltage max. 8 V
Test voltage 12 - 14 V

3. Dimensions

K	3,2 - 3,4 mm
KF	5,7 - 5,9 mm
MS	1,1 - 1,3 mm
LDA	-

Angle of control lever

α	55,0 - 63,0 angle
A	10,5 - 16,0 mm
β	41,0 - 51,0 angle
B	12,5 - 16,5 mm
γ	- angle
C	- mm

B7

Test values

ZEXEL-Distributor pumps



B8

Test values

ZEXEL-Distributor pumps



1. To set

(1) Stop the control lever at the appropriate spot in accordance with the following conditions.

Charge-air pressure: - mmHg
 Pump speed: 1250 /min
 Injection quantity: 35,7 ± 0,5 cm³/1000 strokes

(2) When the control lever is in the position specified above (1), adjust the governor sleeve so that the timing device travel is as previously stipulated. (Page 1/3).

2. Checking load-dependent start of delivery

Stop the control lever at the appropriate spot in accordance with the following conditions, and check load-dependent start of delivery.

Position of control lever			Prescribed values	
Pump speed (1/min)	Injection quantity (cm ³ /1000 strokes)	Charge-air pressure (mmHg)	Timing device travel (mm)	Reduction of timing device travel (mm)
1250	34,7 - 36,7	-	(3,1)	0,2 - 1,0
1250	26,7 - 29,7	-	(2,3)	0,8 - 2,0

B9

Test values
ZEXEL-Distributor pumps



B10

Test values
ZEXEL-Distributor pumps



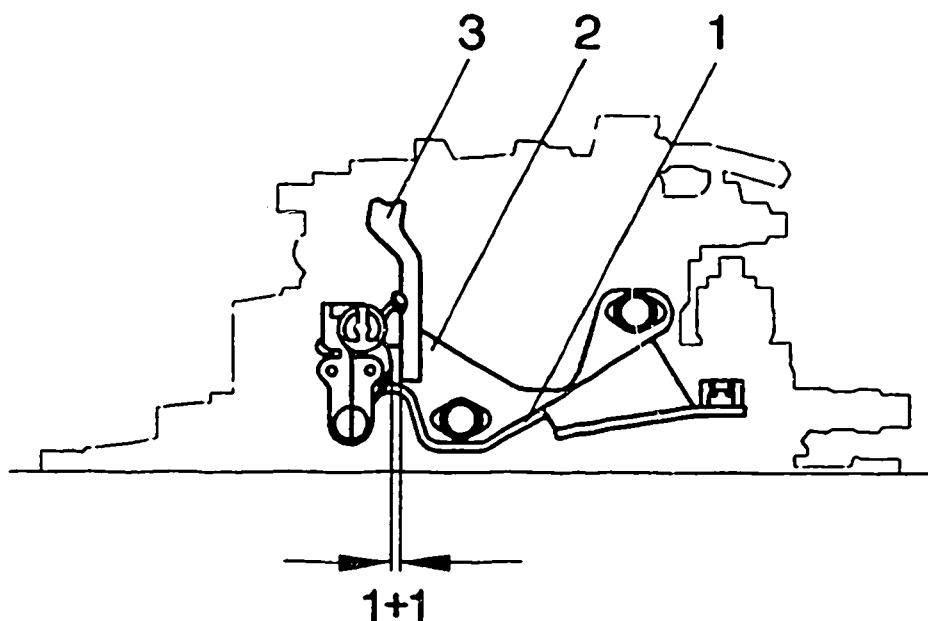


Fig. 3

104740-3672 3/3

- 1 = bracket
- 2 = M-FICD lever
- 3 = control lever

● SETTING THE FICD INSTALLATION POSITION

1. Maintain control lever in the idle position.
2. Set FICD bracket in such a way that the gap dimension between the control lever and the FICD lever equals 1+1 mm.



Test oil:
ISO 4113 od
SAE J967d

ZEXEL - Test values
Distributor pumps
Engine: 4D56

1/2
BOSCH no. 9 460 610 301
DKKC no. 104740-3682
Date: 15.4.1988 (0)
Company: MITSUBISHI
No: MD 106#26

Injection pump no. 104640-3382 (NP-VE4/10F2100RNP461)

Direction of rotation: rear end side clockwise

Prestroke setting: - mm

Test-nozzle holder combination: 1 688 901 000 Test pressure line: 1 680 750 017

1. Setting values		Speed min-1	Setting values	Charge - air pressure - bar (mmHg)	Difference (cc)
1-1	Timing device travel	1250	T=3,5 - 3,9 (mm)		
1-2	Feed pump pressure	1250	4,5 - 5,1 (kg/cm ²)		
1-3	Full load delivery without charge-air pressure	1250	45,3 - 46,3 (cc/1000 strokes)		3,0
	Full load delivery with charge-air pressure		(cc/1000 strokes)		
1-4	Low-idle speed regulation	375	6,5 - 9,5 (cc/1000 strokes)		2,0
1-5	Start	100	63,0 - 83,0 (cc/1000 strokes)		
1-6	Maximum speed regulation	2550	15,1 - 21,1 (cc/1000 strokes)		4,0
1-7	Load-dependent start of delivery	1250	T-0,6 ± 0,2 (mm)		
1-8					

2. Test values

2-1	Timing device	N = min-1 mm	500 0,6 - 1,8	750 1,4 - 2,6	1250 3,3 - 4,1	2100 6,6 - 7,8
2-2	Feed pump	N = min-1 kg/cm ²	600 2,9 - 3,5	1250 4,5 - 5,1	2100 6,5 - 7,1	
2-3	Overflow rate	N = min-1 cc/10s	1250 48,0-92,0			

2-4 Delivery rates

Control lever position	Speed min-1	Delivery rate (cc/1000 strokes)	Charge-air pressure bar (mmHg)	Difference (cc)
End stop	1250	44,8 - 46,8		
	600	42,3 - 46,3		
	2100	37,2 - 41,2		
	2550	14,6 - 21,6		
	2900	below 5,0		
Shut-off	375	0		
Idle stop	600	below 3,0		
	375	6,0 - 10,0		

2-5
Magnet Cut-in voltage max. 8 V
Test voltage 12 - 14 V

3. Dimensions

K 3,2 - 3,4 mm
KF 5,7 - 5,9 mm
MS 1,1 - 1,3 mm
LDA -

Angle of control lever

α 19,0 - 27,0 angle
A 12,4 - 17,8 mm
β 41,0 - 51,0 angle
B 12,1 - 16,1 mm
Y - angle
C - mm

B12

Test values

ZEXEL-Distributor pumps



B13

Test values

ZEXEL-Distributor pumps



1. To set

(1) Stop the control lever at the appropriate spot in accordance with the following conditions.

Charge-air pressure: - mmHg
 Pump speed: 1250 /min
 Injection quantity: 35,7 ± 1 cm³/1000 strokes

(2) When the control lever is in the position specified above (1), adjust the governor sleeve so that the timing device travel is as previously stipulated. (Page 1/2).

2. Checking load-dependent start of delivery

Stop the control lever at the appropriate spot in accordance with the following conditions, and check load-dependent start of delivery.

Position of control lever			Prescribed values	
Pump speed (1/min)	Injection quantity (cm ³ /1000 strokes)	Charge-air pressure (mmHg)	Timing device travel (mm)	Reduction of timing device travel (mm)
1250	34,7 - 36,7	-	(3,1)	0,2 - 1,0
1250	26,7 - 29,7	-	(2,3)	0,8 - 2,0

B14

Test values

ZEXEL-Distributor pumps



B15

Test values

ZEXEL-Distributor pumps



Test oil:
ISO 4113 od
SAE J967d

ZEXEL - Test values
Distributor pumps
Engine: 4D56

1/2
BOSCH no. 9 460 610 318
DKKC no. 104740- 3692
Date: 15.4.1988 (0)
Company: MITSUBISHI
No: MD 109319

Injection pump no. 104640- 3382 (NP-VE4/10F2100RNP461)

Direction of rotation: rear end side clockwise

Prestroke setting: - mm Test-nozzle holder combination: 1 688 901 000 Test pressure line: 1 680 750 017

1. Setting values		Speed min-1	Setting values	Charge - air pressure - bar (mmHg)	Difference (cc)
1-1	Timing device travel	1250	T=3,5 - 3,9 (mm)		
1-2	Feed pump pressure	1250	4,5 - 5,1 (kg/cm ²)		
1-3	Full load delivery without charge-air pressure	1250	45,3 - 46,3 (cc/1000 strokes)		3,0
	Full load delivery with charge-air pressure		(cc/1000 strokes)		
1-4	Low-idle speed regulation	375	6,5 - 9,5 (cc/1000 strokes)		2,0
1-5	Start	100	63,0 - 83,0 (cc/1000 strokes)		
1-6	Maximum speed regulation	2550	15,1 - 21,1 (cc/1000 strokes)		4,0
1-7	Load-dependent start of delivery	1250	T= 0,6 ± 0,2 (mm)		
1-8					

2. Test values					
2-1	Timing device	N = min-1 mm	500 0,6 - 1,8	750 1,4 - 2,6	1250 3,3 - 4,1
					2100 6,6 - 7,8
2-2	Feed pump	N = min-1 kg/cm ²	600 2,9 - 3,5	1250 4,5 - 5,1	2100 6,5 - 7,1
2-3	Overflow rate	N = min-1 cc/10s	1250 48,0-92,0		
2-4 Delivery rates					
Control lever position		Speed min-1	Delivery rate (cc/1000 strokes)	Charge-air pressure bar (mmHg)	Difference (cc)
End stop		1250	44,8 - 46,8		
		600	42,3 - 46,3		
		2100	37,2 - 41,2		
		2550	14,6 - 21,6		
		2900	below 5,0		
Shut-off		375	0		
Idle stop		600	below 3,0		
		375	6,0 - 10,0		
2-5	Magnet	Cut-in voltage max. 8 V Test voltage 12 - 14 V			

3. Dimensions

K	3,2 - 3,4 mm
KF	5,7 - 5,9 mm
MS	1,1 - 1,3 mm
LDA	-

Angle of control lever

α	19,0 - 27,0 angle
A	12,4 - 17,8 mm
β	41,0 - 51,0 angle
B	12,1 - 16,1 mm
Y	- angle
C	- mm

B16

Test values
ZEXEL-Distributor pumps



B17

Test values
ZEXEL-Distributor pumps



1. To set

(1) Stop the control lever at the appropriate spot in accordance with the following conditions.

Charge-air pressure: - mmHg
 Pump speed: 1250 /min
 Injection quantity: 35,7 ± 1 cm³/1000 strokes

(2) When the control lever is in the position specified above (1), adjust the governor sleeve so that the timing device travel is as previously stipulated. (Page 1/2).

2. Checking load-dependent start of delivery

Stop the control lever at the appropriate spot in accordance with the following conditions, and check load-dependent start of delivery.

Position of control lever			Prescribed values	
Pump speed (1/min)	Injection quantity (cm ³ /1000 strokes)	Charge-air pressure (mmHg)	Timing device travel (mm)	Reduction of timing device travel (mm)
1250	34,7 - 36,7	-	(3,1)	0,2 - 1,0
1250	26,7 - 29,7	-	(2,3)	0,8 - 2,0



Test oil:
ISO 4113 od
SAE J967d

ZEXEL - Test values
Distributor pumps
Engine: 4D56

1/2

BOSCH no. 9 460 610 291
DKKC no. 104740-3712
Date: 15.4.1988 (0)
Company: MITSUBISHI
No: MD 106446

Injection pump no. 104640-3392

(NP-VE4/10F2100RNP462)

Direction of rotation: rear end side clockwise

Prestroke setting: - mm

Test-nozzle holder combination: 1 688 901 000 Test pressure line: 1 680 750 017

1. Setting values	Speed min-1	Setting values	Charge - air pressure - bar (mmHg)	Difference (cc)
1-1 Timing device travel	1250	T=3,5 - 3,9 (mm)	540 - 560	
1-2 Feed pump pressure	1250	4,5 - 5,1 (kg/cm ²)	540 - 560	
1-3 Full load delivery with charge-air air pressure	1250	61,4 - 62,4 (cc/1000 strokes)	540 - 560	4,5
Full load delivery with charge-air pressure	750	60,4 - 61,4 (cc/1000 strokes)	320 - 340	
1-4 Low-idle speed regulation	375	6,5 - 9,5 (cc/1000 strokes)	0	2,0
1-5 Start	100	63,0 - 83,0 (cc/1000 strokes)	0	
1-6 Maximum speed regulation	2650	22,2 - 28,2 (cc/1000 strokes)	540 - 560	5,5
1-7 Load-dependent start of delivery	1250	T-0,6 ± 0,2 (mm)	540 - 560	
1-8				

2. Test values

2-1 Timing device	N = min-1 mm	500 0,6 - 1,8	750 1,4 - 2,6	1250 3,3 - 4,1	2100 6,6 - 7,8
2-2 Feed pump	N = min-1 kg/cm ²	600 2,9 - 3,5	1250 4,5 - 5,1	2100 6,5 - 7,1	
2-3 Overflow rate	N = min-1 cc/10s	1250 48,0-92,0			
2-4 Delivery rates					
Control lever position	Speed min-1	Delivery rate (cc/1000 strokes)	Charge-air pressure bar (mmHg)	Difference (cc)	
End stop	1250 600 750 2100 2650 3050	60,9 - 62,9 45,8 - 50,8 59,9 - 61,9 52,8 - 57,8 20,2 - 30,2 below 5,0	540 - 560 0 320 - 340 540 - 560 540 - 560 540 - 560		
Shut-off	375	0	0		
Idle stop	600 375	below 3,0 6,0 - 10,0	0 0		
2-5 Magnet	Cut-in voltage max. 8 V Test voltage 12 - 14 V				

3. Dimensions

K	3,2 - 3,4 mm
KF	5,7 - 5,9 mm
MS	0,9 - 1,1 mm
LDA	3,6 - 3,8 mm

Angle of control lever

α	19,0 - 27,0 angle
A	10,5 - 16,0 mm
β	40,0 - 50,0 angle
B	12,1 - 16,1 mm
γ	- angle
C	- mm

B20

Test values

ZEXEL-Distributor pumps



B21

Test values

ZEXEL-Distributor pumps



Note:

- After setting the full-load at 1250/min, adjust the full-load from 750/min and the accelerator pressure from 0,45 kg/cm² to 330 mmHg, and then regulate the injection quantity with the accelerator-adjustment screw.

Note:

- Setting the timing device stroke:

Fix LDA at 550 mmHg (0,75 kg/cm²)

and put control lever in the full-load delivery position, then set timing device stroke.

- SETTING LOAD-DEPENDENT START OF DELIVERY

1. To set

(1) Stop the control lever at the appropriate spot in accordance with the following conditions.

Charge-air pressure: 540 - 560 mmHg

Pump speed: 1250 /min

Injection quantity: 50,3 ± 0,5 cm³/1000 strokes

(2) When the control lever is in the position specified above (1), adjust the governor sleeve so that the timing device travel is as previously stipulated (page 1/2).

2. Checking load-dependent start of delivery

Stop the control lever at the appropriate spot in accordance with the following conditions, and check load-dependent start of delivery.

Position of control lever			Prescribed values	
Pump speed (1/min)	Injection quantity (cm ³ /1000 strokes)	Charge-air pressure (mmHg)	Timing device travel (mm)	Reduction of timing device travel (mm)
1250	49,3 - 51,3	540 - 560	(3,1)	0,2 - 1,0
1250	38,7 - 41,7	540 - 560	(2,3)	0,8 - 2,0

B22

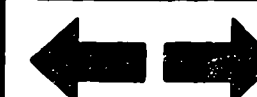
Test values

ZEXEL-Distributor pumps

**B23**

Test values

ZEXEL-Distributor pumps



Test oil:
ISO 4113 od
SAE J967d

ZEXEL - Test values
Distributor pumps
Engine: 4D56T

1/3

BOSCH no. 9 460 610 302
DKKC no. 104740-3722
Date: 15.4.1988 (0)
Company: MITSUBISHI
No: MD 106429

Injection pump no. 104640-3402

(NP-VE4/10F2100RNP463)

Direction of rotation: rear end side clockwise

Prestroke setting: - mm

Test-nozzle holder combination: 1 688 901 000 Test pressure line: 1 680 750 017

1. Setting values		Speed min-1	Setting values	Charge - air pressure - bar (mmHg)	Difference (cc)
1-1	Timing device travel	1250	T=3,5 - 3,9 (mm)	540 - 560	
1-2	Feed pump pressure	1250	4,5 - 5,1 (kg/cm ²)	540 - 560	
1-3	Full load delivery with charge-air air pressure	1250	61,4 - 62,4 (cc/1000 strokes)	540 - 560	4,5
	Full load delivery with charge-air pressure	750	60,4 - 61,4 (cc/1000 strokes)	320 - 340	
1-4	Low-idle speed regulation	375	6,5 - 9,5 (cc/1000 strokes)	0	2,0
1-5	Start	100	63,0 - 83,0 (cc/1000 strokes)	0	
1-6	Maximum speed regulation	2650	22,2 - 28,2 (cc/1000 strokes)	540 - 560	5,5
1-7	Load-dependent start of delivery	1250	T=0,6 ± 0,2 (mm)	540 - 560	
1-8					

2. Test values

2-1	Timing device	N = min-1	500	750	1250	2100
		mm	0,6 - 1,8	1,4 - 2,6	3,3 - 4,1	6,6 - 7,8
2-2	Feed pump	N = min-1	600	1250	2100	
		kg/cm ²	2,9 - 3,5	4,5 - 5,1	6,5 - 7,1	
2-3	Overflow rate	N = min-1	1250			
		cc/10s	48,0-92,0			
2-4	Delivery rates					
	Control lever position	Speed min-1	Delivery rate (cc/1000 strokes)	Charge-air pressure bar (mmHg)	Difference (cc)	
	End stop	1250	60,9 - 62,9	540 - 560		
		600	45,8 - 50,8	0		
		750	59,9 - 61,9	320 - 340		
		2100	52,8 - 57,8	540 - 560		
		2650	20,2 - 30,2	540 - 560		
		3050	below 5,0	540 - 560		
	Shut-off	375	0	0		
	Idle stop	600	below 3,0	0		
		375	6,0 - 10,0	0		
2-5	Magnet	Cut-in voltage max. 8 V Test voltage 12 - 14 V				

3. Dimensions

K	3,2 - 3,4 mm
KF	5,7 - 5,9 mm
MS	0,9 - 1,1 mm
LDA	3,6 - 3,8 mm

Angle of control lever

α	19,0 - 27,0 angle
A	10,5 - 16,0 mm
β	40,0 - 50,0 angle
B	12,1 - 16,1 mm
Y	- angle
C	- mm

C1

Test values

ZEXEL-Distributor pumps



C2

Test values

ZEXEL-Distributor pumps



Note:

- After setting the full-load at 1250/min, adjust the full-load from 750/min and the accelerator pressure from

0,45 kg/cm² to 330 mmHg,

and then regulate the injection quantity with the accelerator-adjustment screw.

Note:

- Setting the timing device stroke:

Fix LDA at 550 mmHg (0,75 kg/cm²)

and put control lever in the full-load delivery position, then set timing device stroke.

- SETTING A/T CONNECTING LEVER

1. Turn control lever from the idle position to full-load position, and check that the travel (L) of the A/T lever equals

32,9 ± 1 mm.

2. When the measurement L is not as prescribed, loosen the screw and adjust the A/T lever.
3. Following adjustment, tighten screw.

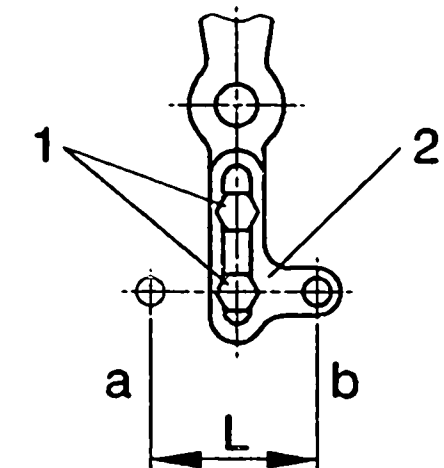


Fig. 4

1 = screw
2 = A/T lever
a = full-load
b = idle

C3

Test values

ZEXEL-Distributor pumps

**C4**

Test values

ZEXEL-Distributor pumps



1. To set

(1) Stop the control lever at the appropriate spot in accordance with the following conditions.

Charge-air pressure: 540 - 560 mmHg
 Pump speed: 1250 /min
 Injection quantity: 50,3 ± 0,5 cm³/1000 strokes

(2) When the control lever is in the position specified above (1), adjust the governor sleeve so that the timing device travel is as previously stipulated.

2. Checking load-dependent start of delivery

Stop the control lever at the appropriate spot in accordance with the following conditions, and check load-dependent start of delivery.

Position of control lever			Prescribed values	
Pump speed (l/min)	Injection quantity (cm ³ /1000 strokes)	Charge-air pressure (mmHg)	Timing device travel (mm)	Reduction of timing device travel (mm)
1250	49,3 - 51,3	540 - 560	(3,1)	0,2 - 1,0
1250	38,7 - 41,7	540 - 560	(2,3)	0,8 - 2,0

C5

Test values

ZEXEL-Distributor pumps



C6

Test values

ZEXEL-Distributor pumps



Test oil:
ISO 4113 od
SAE J967d

ZEXEL - Test values
Distributor pumps
Engine: 4D56

1/2
BOSCH no. 9 460 610 303
DKKC no. 104740-3762
Date: 15.4.1988 (0)
Company: MITSUBISHI
No: MD 120184

Injection pump no. 104640-3432

(NP-VE4/10F2000RNP515)

Direction of rotation: rear end side clockwise

Prestroke setting: - mm

Test-nozzle holder combination: 1 688 901 000 Test pressure line: 1 680 750 017

1. Setting values		Speed min-1	Setting values	Charge - air pressure - bar (mmHg)	Difference (cc)
1-1	Timing device travel	1250	T=3,5 - 3,9 (mm)		
1-2	Feed pump pressure	1250	4,5 - 5,1 (kg/cm ²)		
1-3	Full load delivery without charge-air pressure	1250	45,3 - 46,3 (cc/1000 strokes)		3,0
	Full load delivery with charge-air pressure		(cc/1000 strokes)		
1-4	Low-idle speed regulation	375	6,5 - 9,5 (cc/1000 strokes)		2,0
1-5	Start	100	63,0 - 83,0 (cc/1000 strokes)		
1-6	Maximum speed regulation	2150	15,1 - 21,1 (cc/1000 strokes)		4,0
1-7	Load-dependent start of delivery	1250	T=0,4 - 0,8 (mm)		
1-8					

2. Test values

2-1	Timing device	N = min-1 mm	500 0,6 - 1,8	750 1,4 - 2,6	1250 3,3 - 4,1	2000 6,2 - 7,4
2-2	Feed pump	N = min-1 kg/cm ²	600 2,9 - 3,5	1250 4,5 - 5,1	2000 6,3 - 6,9	
2-3	Overflow rate	N = min-1 cc/10s	1250 48,0-92,0			

2-4 Delivery rates

Control lever position	Speed min-1	Delivery rate (cc/1000 strokes)	Charge-air pressure bar (mmHg)	Difference (cc)
End stop	1250	44,8 - 46,8		
	600	42,3 - 46,3		
	2000	37,2 - 41,2		
	2150	13,1 - 23,1		
	2500	below 5,0		
Shut-off	375	0		
Idle stop	375	6,0 - 10,0		
	600	below 3,0		

2-5
Magnet Cut-in voltage max. 8 V
Test voltage 12 - 14 V

3. Dimensions

K	3,2 - 3,4 mm
KF	5,7 - 5,9 mm
MS	1,1 - 1,3 mm
LDA	-

Angle of control lever

α	55,0 - 63,0 angle
A	10,5 - 16,0 mm
β	39,0 - 49,0 angle
B	11,7 - 15,7 mm
Y	- angle
C	- mm

C7

Test values
ZEXEL-Distributor pumps



C8

Test values
ZEXEL-Distributor pumps



1. To set

(1) Stop the control lever at the appropriate spot in accordance with the following conditions.

Charge-air pressure: - mmHg
 Pump speed: 1250 /min
 Injection quantity: 35,2 - 36,2 cm³/1000 strokes

(2) When the control lever is in the position specified above (1), adjust the governor sleeve so that the timing device travel is as previously stipulated. (Page 1/2).

2. Checking load-dependent start of delivery

Stop the control lever at the appropriate spot in accordance with the following conditions, and check load-dependent start of delivery.

Position of control lever			Prescribed values	
Pump speed (1/min)	Injection quantity (cm ³ /1000 strokes)	Charge-air pressure (mmHg)	Timing device travel (mm)	Reduction of timing device travel (mm)
1250	34.7 - 36.7	-	(3.1)	0.2 - 1.0
1250	26.7 - 29.7	-	(2.3)	0.8 - 2.0

C9

Test values

ZEXEL-Distributor pumps



C10

Test values

ZEXEL-Distributor pumps



Test oil:
ISO 4113 od
SAE J967d

ZEXEL - Test values
Distributor pumps
Engine: TD25

1/2
BOSCH no. 9 460 610 314
DKKC no. 104740-9633
Date: 15.4.1988 (0)
Company: NISSAN DIESEL
No: 16700 44G04

Injection pump no. 104640-9633 (NP-VE4/10F2150RNP567)

Direction of rotation: rear end side clockwise

Prestroke setting:

Test-nozzle holder combination: 1 688 901 000 Test pressure line: 1 680 750 017

1. Setting values		Speed min-1	Setting values	Charge - air pressure - bar (mmHg)	Difference (cc)
1-1	Timing device travel	1700	on 6,1 - 6,9 (mm)		
1-2	Feed pump pressure	1700	off 4,7 - 5,1 on 5,9 - 6,7 (kg/cm ²) off 4,9 - 5,5		
1-3	Full load delivery without charge- air pressure	1100	48,0 - 49,0 (cc/1000 strokes)		3,0
1-4	Low-idle speed regulation	350	4,5 - 8,5 (cc/1000 strokes)		2,0
1-5	Start	100	45,0 - 80,0 (cc/1000 strokes)		
1-6	Maximum speed regulation	2500	10,1 - 14,1 (cc/1000 strokes)		
1-7	Load-dependent start of delivery				
1-8					

2. Test values

2-1	Timing device	Pulling electro- magnet N = min-1 mm	ON	1700	1700	OFF	2300
				6,0-7,0	4,6-5,2		6,0-7,0
2-2	Feed pump	N = min-1 kg/cm ²	1000	1700	1000	1700	2150
			4,5-5,3	5,9-6,7	3,5-4,1	4,9-5,5	5,8-6,4
2-3	Overflow rate	N = min-1 cc/10s	1100	1100	(without O-ring)		
			43,0-87,0	60-130			

2-4 Delivery rates

Control lever position	Speed min-1	Delivery rate (cc/1000 strokes)	Charge-air pressure bar (mmHg)	Difference (cc)
End stop	1100	47,5 - 49,5		
	600	45,1 - 49,1		
	2150	38,5 - 42,8		
	2300	28,3 - 37,3		
	2500	9,6 - 14,6		
	2700	below 5,0		
Shut-off	350	0		
Idle stop	350	4,5 - 8,5		
	450	below 3,0		

2-5
Magnet Cut-in voltage max. 8 V
Test voltage 12 - 14 V

3. Dimensions

K	3,2 - 3,4	mm
KF	5,7 - 5,9	mm
MS	0,9 - 1,1	mm
LDA	-	mm

Angle of control lever

α	35,5 - 43,5	angle
YA	24,3 - 28,7	mm
β	31,0 - 41,0	angle
B	9,3 - 12,9	mm
Y	-	angle
C	-	mm

C11

Test values

ZEXEL-Distributor pumps



C12

Test values

ZEXEL-Distributor pumps



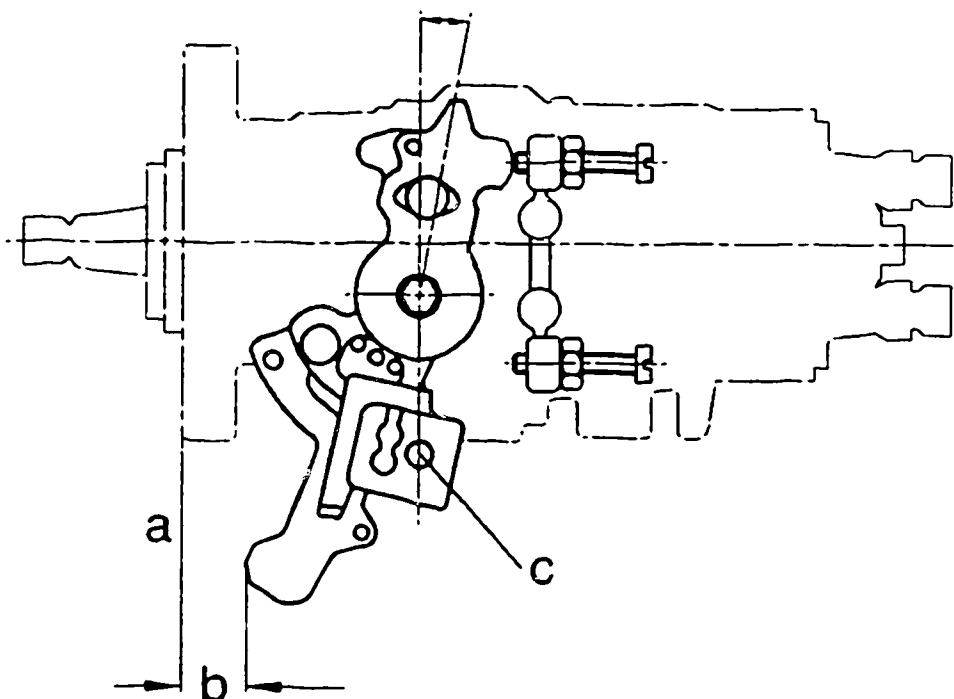


Fig. 5

104740-9633 2/2

a = flange facing
b = measurement "YA"
c = bore A

- POSITION FOR MEASURING CONTROL LEVER ANGLE
(1) Measure control lever angle (α , β , γ) at bore A.

Note:

- The pulling electromagnet is not defined as ON or OFF.
All specifications here correspond to OFF.



Test oil:
ISO 4113 od
SAE J967d

ZEXEL - Test values
Distributor pumps
Engine: 4JB1-A

BOSCH no. 9 460 610 319
DKKC no. 104741-1272
Date: 15.4.1988 (0)
Company: ISUZU
No: 894426 8511

Injection pump no. 104641-1172 (NP-VE4/11F1800RNP419)

Direction of rotation: rear end side clockwise

Prestroke setting: 0,43 - 0,47 mm Test-nozzle holder combination: 1 688 901 000 Test pressure line: 1 680 750 017

1. Setting values		Speed min-1	Setting values	Charge - air pressure - bar (mmHg)	Difference (cc)
1-1	Timing device travel	1550	1,7 - 2,1 (mm)		
1-2	Feed pump pressure	1550	5,1 - 5,5 (kg/cm ²)		
1-3	Full load delivery without charge-air pressure	1000	44,1 - 45,1 (cc/1000 strokes)		3,5
	Full load delivery with charge-air pressure		(cc/1000 strokes)		
1-4	Low-idle speed regulation	390	7,0 - 11,0 (cc/1000 strokes)		2,0
1-5	Start	100	75,0 - 115,0 (cc/1000 strokes)		
1-6	Maximum speed regulation	2100	9,8 - 15,8 (cc/1000 strokes)		3,5
1-7	Load-dependent start of delivery				
1-8					

2. Test values

2-1	Timing device	Pulling electro-magnet N = min ⁻¹ mm	690 ^{on} 890 0,5	1400-1500 0,5	off 1550 1900 1,6 - 2,2 5,3 - 6,2
2-2	Feed pump	N = min-1 kg/cm ²	1000 3,1 - 3,7	1550 5,1 - 5,5	1850 6,0 - 6,6
2-3	Overflow rate	N = min-1 cc/10s	1550 67,0-111,0		
2-4	Delivery rates				
Control lever position		Speed min-1	Delivery rate (cc/1000 strokes)	Charge-air pressure bar (mmHg)	Difference (cc)
End stop		1000	43,6 - 45,6		
		500	41,8 - 48,8		
		700	34,3 - 38,3		
		1350	45,0 - 49,0		
		1700	44,4 - 49,4		
		1900	32,5 - 39,5		
		2100	9,3 - 16,3		
		2300	below 7,0		
Shut-off		390	0		
Idle stop		390	7,0 - 11,0		
		550	below 3,0		
2-5	Magnet	Cut-in voltage max. 8 V Test voltage 12 - 14 V			

3. Dimensions

K	2,7 - 2,9 mm
KF	4,9 - 5,1 mm
MS	0,9 - 1,1 mm
LDA	- mm

Angle of control lever

α	14,0 - 22,0 angle
A	2,5 - 7,6 mm
β	30,0 - 40,0 angle
B	8,7 - 12,6 mm
γ	- angle
C	- mm

Note:

The pulling electromagnet is not defined as ON or OFF. All specifications here correspond to OFF.

C14

Test values
ZEXEL-Distributor pumps



C15

Test values
ZEXEL-Distributor pumps



Test oil:
ISO 4113 od
SAE J967d

ZEXEL - Test values
Distributor pumps
Engine: 4JB1CDT

1/2
BOSCH no. 9 460 610 315
DKKC no. 104741-1742
Date: 15.4.1988 (0)
Company: ISUZU
No: 894475 1614

Injection pump no. 104641-1742 (NP-VE4/11F1900RNP578)

Direction of rotation: rear end side clockwise

Prestroke setting: - mm

Test-nozzle holder combination: 1 688 901 000 Test pressure line: 1 680 750 017

1. Setting values		Speed min ⁻¹	Setting values	Charge - air pressure - bar (mmHg)	Difference (cc)
1-1	Timing device travel	1700	5,0 - 5,4 (mm)	590 - 610	
1-2	Feed pump pressure	1700	5,2 - 5,6 (kg/cm ²)	590 - 610	
1-3	Full load delivery without charge-air pressure	1250	63,2 - 64,2 (cc/1000 strokes)	590 - 610	3,5
	Full load delivery with charge-air pressure	900	50,9 - 51,9 (cc/1000 strokes)	340 - 360	4,5
1-4	Low-idle speed regulation	385	3,1 - 7,1 (cc/1000 strokes)	0	2,0
1-5	Start	100	60,0 - 100,0 (cc/1000 strokes)	0	
1-6	Maximum speed regulation	2300	19,3 - 25,4 (cc/1000 strokes)	590 - 610	4,5
1-7	Load-dependent start of delivery				
1-8					

2. Test values

2-1	Timing device	Pulling electro-magnet N = min ⁻¹ mm	ON 500 over 0,5	OFF 1450 1700 1850 2,1-2,9 4,9-5,5 5,8-6,5
2-2	Feed pump	N = min ⁻¹ kg/cm ²	500 4,0-6,0	500 1450 1700 1850 over 0,8 4,3-4,9 5,2-5,6 5,6-6,2
2-3	Overflow rate	N = min ⁻¹ cc/10s	1700 73 - 150	

2-4 Delivery rates

Control lever position	Speed min ⁻¹	Delivery rate (cc/1000 strokes)	Charge-air pressure bar (mmHg)	Difference (cc)
End stop	1250	62,7 - 64,7	590 - 610	
	600	33,1 - 41,1	90 - 110	
	750	38,7 - 42,7	170 - 180	
	900	50,4 - 52,4	340 - 360	
	1800	54,6 - 61,6	590 - 610	
	2300	18,8 - 25,8	590 - 610	
	2500	below 5,0	590 - 610	
Shut-off	385	0	0	
Idle stop	385	3,1 - 7,1	0	
		below 3,0	0	

2-5
Magnet Cut-in voltage max. 8 V
Test voltage 12 - 14 V

3. Dimensions

K	2,7 - 2,9 mm
KF	5,7 - 5,9 mm
MS	0,8 - 1,0 mm
LDA	4,4 - 4,6 mm

Angle of control lever

α	14,0 - 22,0 angle
A	11,3 - 14,7 mm
β	32,0 - 42,0 angle
B	10,1 - 13,6 mm
γ	- angle
C	- mm

C16

Test values

ZEXEL-Distributor pumps



C17

Test values

ZEXEL-Distributor pumps



Note:

104741-1742 2/2

- After setting the full-load at 1250/min, adjust the full-load from 900/min and the accelerator pressure from 340 - 360 mmHg, and then set the injection quantity with the accelerator compensator-adjustment screw.
- The pulling electromagnet is not defined as ON or OFF. All specifications here correspond to OFF.
- When checking the timing device travel and feed pump pressure, apply charge-air pressure of 590 - 610 mmHg to the charge-air pressure chamber.

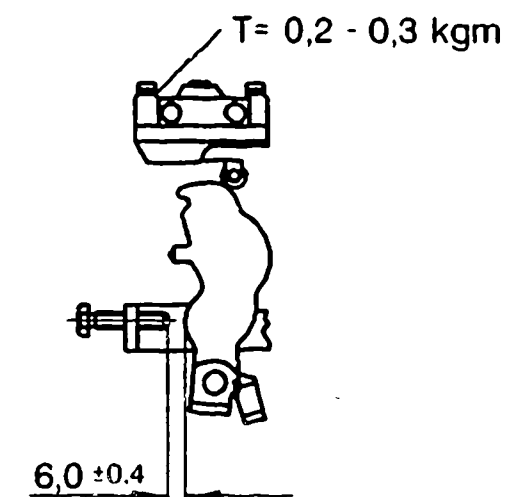


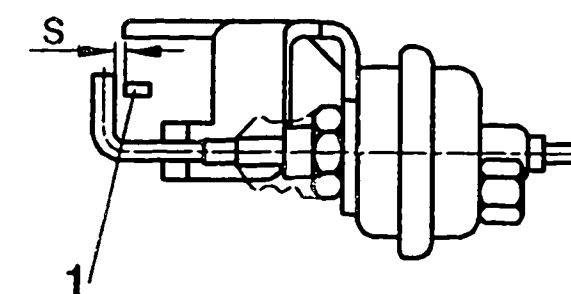
Fig. 6

- **SETTING MICROSWITCH**
 1. Position control lever so that the distance between the lever and the idle stop screw equals
 $6.0 \pm 0.4 \text{ mm}$
(control lever angle: $13^\circ - 15^\circ$) and lock lever into place.
 2. Choose the mounting position of the microswitch so that it is switched to OFF.

Fig. 7

1 = control lever

- **SETTING THE V-FICD (set when W-KSB is loosened)**
 - 1) Setting installation position of V-FICD.
 1. Lock control lever in the idle position.
 2. Set V-FICD bracket in such a way that the gap dimension "S" between the box rod and the pin pressed into the control lever equals $1 \pm 1 \text{ mm}$.
 - 2) Setting V-FICD travel
 1. Keep control lever in idle position.
 2. Apply vacuum of 400 mmHg to interior of vacuum control unit.
 3. Check whether the V-FICD consumer-shaft makes the whole stroke.



C18

Test values

ZEXEL-Distributor pumps



C19

Test values

ZEXEL-Distributor pumps



Test oil:
ISO 4113 od
SAE J967d

ZEXEL - Test values
Distributor pumps
Engine: 4JB1CDT

1/2
BOSCH no. 9 460 610 316
DKKC no. 104741-1752
Date: 15.4.1988 (0)
Company: ISUZU
No: 894475 1624

Injection pump no. 104641-1742

(NP-VE4/11F1900RNP578)

Direction of rotation: rear end side clockwise

Prestroke setting: - mm

Test-nozzle holder combination: 1 688 901 000 Test pressure line: 1 680 750 017

1. Setting values		Speed min ⁻¹	Setting values	Charge - air pressure - bar (mmHg)	Difference (cc)
1-1	Timing device travel	1700	5,0 - 5,4 (mm)	590 - 610	
1-2	Feed pump pressure	1700	5,2 - 5,6 (kg/cm ²)	590 - 610	
1-3	Full load delivery without charge-air pressure	1250	63,2 - 64,2 (cc/1000 strokes)	590 - 610	3,5
	Full load delivery with charge-air pressure	900	50,9 - 51,9 (cc/1000 strokes)	340 - 360	4,5
1-4	Low-idle speed regulation	385	3,1 - 7,1 (cc/1000 strokes)	0	2,0
1-5	Start	100	60,0 - 100,0 (cc/1000 strokes)	0	
1-6	Maximum speed regulation	2300	19,3 - 25,4 (cc/1000 strokes)	590 - 610	4,5
1-7	Load-dependent start of delivery				
1-8					

2. Test values

2-1 Timing device	Pulling electro-magnet N = min ⁻¹ mm	ON 500 over 0,5	OFF 1450 1700 1850 2,1-2,9 4,9-5,5 5,8-6,5	
2-2 Feed pump	N = min ⁻¹ kg/cm ²	500 4,0-6,0	500 over 0,8 4,3-4,9 5,2-5,6 5,6-6,2	
2-3 Overflow rate	N = min ⁻¹ cc/10s		1700 73 - 150	
2-4 Delivery rates				
Control lever position	Speed min ⁻¹	Delivery rate (cc/1000 strokes)	Charge-air pressure bar (mmHg)	Difference (cc)
End stop	1250	62,7 - 64,7	590 - 610	
	600	33,1 - 41,1	90 - 110	
	750	38,7 - 42,7	170 - 180	
	900	50,4 - 52,4	340 - 360	
	1800	54,6 - 61,6	590 - 610	
	2300	18,8 - 25,8	590 - 610	
	2500	below 5,0	590 - 610	
Shut-off	385	0	0	
Idle stop	385	3,1 - 7,1	0	
		below 3,0	0	
2-5 Magnet	Cut-in voltage max. 8 V Test voltage 12 - 14 V			

3. Dimensions

K	2,7 - 2,9 mm
KF	5,7 - 5,9 mm
MS	0,8 - 1,0 mm
LDA	4,4 - 4,6 mm

Angle of control lever

α	14,0 - 22,0 angle
A	11,3 - 14,7 mm
β	32,0 - 42,0 angle
B	10,1 - 13,6 mm
γ	- angle
C	- mm

C20

Test values

ZEXEL-Distributor pumps



C21

Test values

ZEXEL-Distributor pumps



Note:

- After setting the full-load at 1250/min, adjust the full-load from 900/min and the accelerator pressure from 340 - 360 mmHg, and then set the injection quantity with the accelerator compensator-adjustment screw.
- The pulling electromagnet is not defined as ON or OFF. All specifications here correspond to OFF.
- When checking the timing device travel and feed pump pressure, apply charge-air pressure of 590 - 610 mmHg to the charge-air pressure chamber.

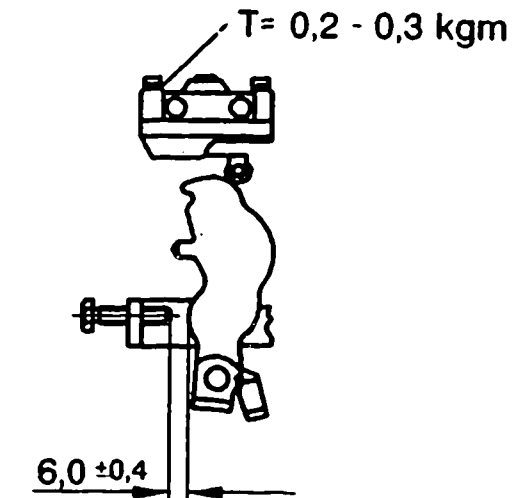


Fig. 8

- **SETTING MICROSWITCH**

1. Position control lever so that the distance between the lever and the idle stop screw equals
 $6.0 \pm 0.4 \text{ mm}$

(control lever angle: $13^\circ - 15^\circ$) and lock lever into place.

2. Choose the mounting position of the microswitch so that it is switched to OFF.

Fig. 9

1 = control lever

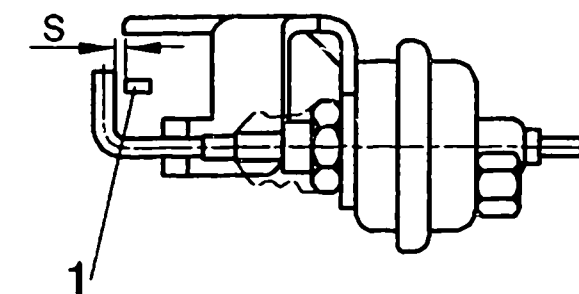
- **SETTING THE V-FICD (set when W-KSB is loosened)**

- 1) Setting installation position of V-FICD.

1. Lock control lever in the idle position.
2. Set V-FICD bracket in such a way that the gap dimension "S" between the box rod and the pin pressed into the control lever equals $1 \pm 1 \text{ mm}$.

- 2) Setting V-FICD travel

1. Keep control lever in idle position.
2. Apply vacuum of 400 mmHg to interior of vacuum control unit.
3. Check whether the V-FICD consumer-shaft makes the whole stroke.

**C22**

Test values

ZEXEL-Distributor pumps

**C23**

Test values

ZEXEL-Distributor pumps



Test oil:
ISO 4113 od
SAE J967d

ZEXEL - Test values
Distributor pumps
Engine: RF

1/4
BOSCH no. 9 460 610 304
DKKC no. 104748-0135
Date: 15.4.1988 (0)
Company: MAZDA
No: RF01 13 800E

Injection pump no. 104648-0135 (NP-VE4/8F2325RNP205)

Direction of rotation: rear end side clockwise

Prestroke setting: - mm

Test-nozzle holder combination: 1 688 901 000 Test pressure line: 1 680 750 017

1. Setting values		Speed min-1	Setting values	Charge - air pressure - bar (mmHg)	Difference (cc)
1-1	Timing device travel	1375	4,5 - 4,9 (mm)		
1-2	Feed pump pressure	1375	4,4 - 5,0 (kg/cm ²)		
1-3	Full load delivery without charge-air pressure	1375	35,6 - 36,6 (cc/1000 strokes)		2,5
	Full load delivery with charge-air pressure		(cc/1000 strokes)		
1-4	Low-idle speed regulation	350	6,0 - 10,0 (cc/1000 strokes)		2,0
1-5	Start	100	over 42,0 (cc/1000 strokes)		
1-6	Maximum speed regulation	2500	19,1 - 23,1 (cc/1000 strokes)		
1-7	Load-dependent start of delivery	1375	3,9 - 4,3 (mm)		
1-8					

2. Test values

2-1	Timing device	N = min-1 mm	1375 4,4 - 5,0	1750 6,1 - 7,3	2325 7,2 - 8,4
2-2	Feed pump	N = min-1 kg/cm ²	500 1,9 - 2,5	1375 4,4 - 5,0	2325 7,0 - 7,6
2-3	Overflow rate	N = min-1 cc/10s	1375 46,3 - 90,3		
2-4	Delivery rates				
Control lever position		Speed min-1	Delivery rate (cc/1000 strokes)	Charge-air pressure bar (mmHg)	Difference (cc)
End stop		1375	35,1 - 37,1		
		500	28,0 - 32,0		
		2325	30,2 - 34,2		
		2500	18,1 - 24,1		
		2750	below 4,0		
Shut-off		350	0		
Idle stop		350	6,0 - 10,0		
		450	below 4,0		
2-5	Magnet	Cut-in voltage max. 8 V Test voltage 12 - 14 V			

3. Dimensions

K	3,2 - 3,4 mm
KF	5,7 - 5,9 mm
MS	1,4 - 1,6 mm
LDA	-

Angle of control lever

α	26,0 - 34,0 angle
A	4,0 - 9,5 mm
β	40,0 - 50,0 angle
B	12,5 - 15,8 mm
Y	- angle
C	- mm

D1

Test values

ZEXEL-Distributor pumps



D2

Test values

ZEXEL-Distributor pumps



1. To set

(1) Stop the control lever at the appropriate spot in accordance with the following conditions.

Charge-air pressure: - mmHg
 Pump speed: 1375 /min
 Injection quantity: $28,2 \pm 1$ cm³/1000 strokes

(2) When the control lever is in the position specified above (1), adjust the governor sleeve so that the timing device travel is as previously stipulated. (Page 1 / 4).

2. Checking load-dependent start of delivery

Stop the control lever at the appropriate spot in accordance with the following conditions, and check load-dependent start of delivery.

Position of control lever			Prescribed values	
Pump speed (1/min)	Injection quantity (cm ³ /1000 strokes)	Charge-air pressure (mmHg)	Timing device travel (mm)	Reduction of timing device travel (mm)
1375	$28,2 \pm 1,5$	-	$4,1 \pm 0,3$	-
1375	$16,1 \pm 1,5$	-	$2,9 \pm 0,7$	-

D3

Test values

ZEXEL-Distributor pumps



D4

Test values

ZEXEL-Distributor pumps



1) Setting the M-KSB stop

1. Fix M-KSB unit temporarily to pump casing.
2. Crank drive shaft at least twice in the direction of rotation of the pump.
3. Crank drive shaft slowly, and lock into position at the point where resistance is felt (roller in the bracket is now laying against the disc cam).
4. Rotate KSB lever in direction of adjustment.
5. Hold KSB lever at the position in which the knuckle bolts are just touching the head of the shaft of the roller bracket (roller bracket - advance angle "0").
6. Set stop in such a way that the gap dimension between the KSB lever and the stop equals
 $0.5 \pm 2 \text{ mm}$.
7. After setting, tighten the fixing screw with the torque prescribed for M-KSB
 $T = 0.6 - 0.9 \text{ kpm}$.

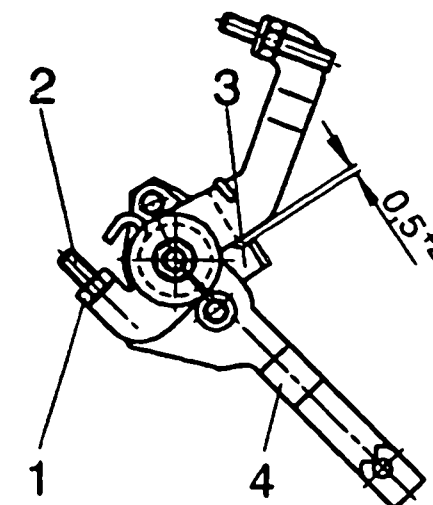


Fig. 10
1 = nut
2 = adjustment screw
3 = stop
4 = KSB lever

2) Setting the FICD screw

1. Turn KSB lever the other way until it touches the stop.
2. Insert guage block (feeler gauge)
 $4.8 \pm 0.1 \text{ mm}$
between control lever and idle stop screw (distance from idle position 7°).
3. Set FICD screw in such a way that the control lever and the FICD screw are touching.

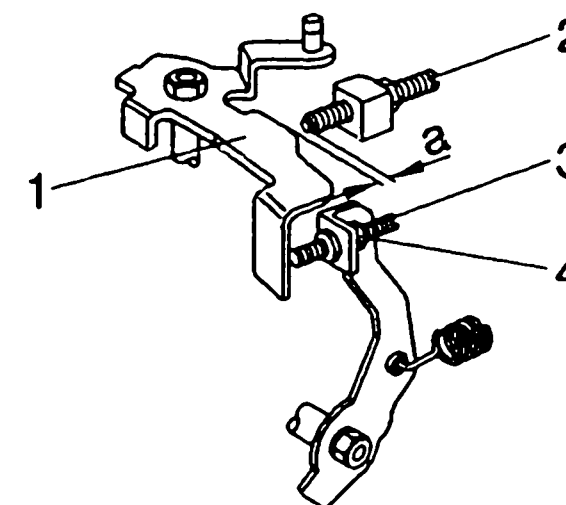


Fig. 11
1 = control lever
2 = idle stop screw
3 = FICD screw
4 = nut
a = gauge block



Test oil:
ISO 4113 od
SAE J967d

ZEXEL - Test values
Distributor pumps
Engine: RF

1/5
BOSCH no. 9 460 610 305
DKKC no. 104748-0145
Date: 15.4.1988 (0)
Company: MAZDA
No: RF02 13 800E

Injection pump no. 104648-0145 (NP-VE4/8F2325RNP206)

Direction of rotation: rear end side clockwise

Prestroke setting: - mm

Test-nozzle holder combination: 1 688 901 000 Test pressure line: 1 680 750 017

1. Setting values		Speed min-1	Setting values	Charge - air pressure - bar (mmHg)	Difference (cc)
1-1	Timing device travel	1375	4,5 - 4,9 (mm)		
1-2	Feed pump pressure	1375	4,4 - 5,0 (kg/cm ²)		
1-3	Full load delivery without charge-air pressure	1375	35,6 - 36,6 (cc/1000 strokes)		2,5
	Full load delivery with charge-air pressure		(cc/1000 strokes)		
1-4	Low-idle speed regulation	350	6,0 - 10,0 (cc/1000 strokes)		2,0
1-5	Start	100	over 42,0 (cc/1000 strokes)		
1-6	Maximum speed regulation	2500	19,1 - 23,1 (cc/1000 strokes)		
1-7	Load-dependent start of delivery	1375	3,9 - 4,3 (mm)		
1-8					

2. Test values

2-1	Timing device	N = min-1 mm	1375 4,4 - 5,0	1750 6,1 - 7,3	2325 7,2 - 8,4
2-2	Feed pump	N = min-1 kg/cm ²	500 1,9 - 2,5	1375 4,4 - 5,0	2325 7,0 - 7,6
2-3	Overflow rate	N = min-1 cc/10s	1375 46,3 - 90,3		
2-4	Delivery rates				
Control lever position		Speed min-1	Delivery rate (cc/1000 strokes)	Charge-air pressure bar (mmHg)	Difference (cc)
End stop		1375	35,1 - 37,1		
		500	28,0 - 32,0		
		2325	30,2 - 34,2		
		2500	18,1 - 24,1		
		2750	below 4,0		
Shut-off		350	0		
Idle stop		350	6,0 - 10,0		
		450	below 4,0		
2-5	Magnet	Cut-in voltage max. 8 V Test voltage 12 - 14 V			

3. Dimensions

K	3,2 - 3,4 mm
KF	5,7 - 5,9 mm
MS	1,4 - 1,6 mm
LDA	-

Angle of control lever

α	26,0 - 34,0 angle
A	4,0 - 9,5 mm
β	40,0 - 50,0 angle
B	12,5 - 15,8 mm
Y	- angle
C	- mm

D7

Test values

ZEXEL-Distributor pumps



D8

Test values

ZEXEL-Distributor pumps



1. To set

(1) Stop the control lever at the appropriate spot in accordance with the following conditions.

Charge-air pressure: - mmHg
 Pump speed: 1375 /min
 Injection quantity: $28,2 \pm 1$ cm³/1000 strokes

(2) When the control lever is in the position specified above (1), adjust the governor sleeve so that the timing device travel is as previously stipulated. (Page 1/5)

2. Checking load-dependent start of delivery

Stop the control lever at the appropriate spot in accordance with the following conditions, and check load-dependent start of delivery.

Position of control lever			Prescribed values	
Pump speed (1/min)	Injection quantity (cm ³ /1000 strokes)	Charge-air pressure (mmHg)	Timing device travel (mm)	Reduction of timing device travel (mm)
1375	$28,2 \pm 1,5$	-	$4,1 \pm 0,3$	-
1375	$16,1 \pm 1,5$	-	$2,9 \pm 0,7$	-

D9

Test values

ZEXEL-Distributor pumps



D10

Test values

ZEXEL-Distributor pumps



1) Setting the M-KSB stop

1. Fix M-KSB unit temporarily to pump casing.
2. Crank drive shaft at least twice in the direction of rotation of the pump.
3. Crank drive shaft slowly, and lock into position at the point where resistance is felt (roller in the bracket is now laying against the disc cam).
4. Rotate KSB lever in direction of adjustment.
5. Hold KSB lever at the position in which the knuckle bolts are just touching the head of the shaft of the roller bracket (roller bracket - advance angle "0").
6. Set stop in such a way that the gap dimension between the KSB lever and the stop equals
 $0.5 \pm 2 \text{ mm.}$
7. After setting, tighten the fixing screw with the torque prescribed for M-KSB
 $T = 0.6 - 0.9 \text{ kpm.}$

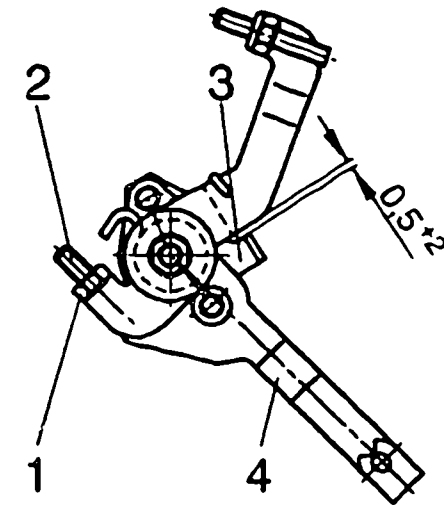


Fig. 12

- 1 = nut
 2 = adjustment screw
 3 = stop
 4 = KSB lever



1. Turn KSB lever the other way until it touches the stop.
2. Insert gauge block (feeler gauge)

$4.8 \pm 0,1 \text{ mm}$

between control lever and idle stop screw (distance from idle position 7°).

3. Set FICD screw so that the control lever and the FICD screw are touching.

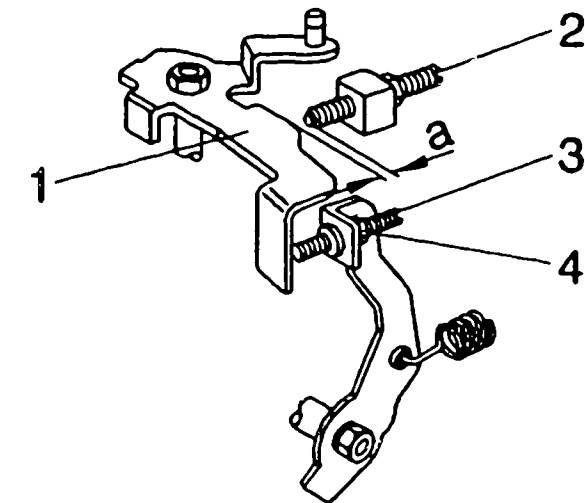


Fig. 13

1 = control lever
 2 = idle stop screw
 3 = FICD screw
 4 = nut
 a = gauge block

● SETTING MICROSWITCH

1. Position control lever so that the distance between the lever and the idle stop screw equals

$8.5 \pm 1 \text{ mm}$

(control lever angle: 12.5°) and lock lever into place.

2. Set adjustment screw so that the microswitch is switched to ON.

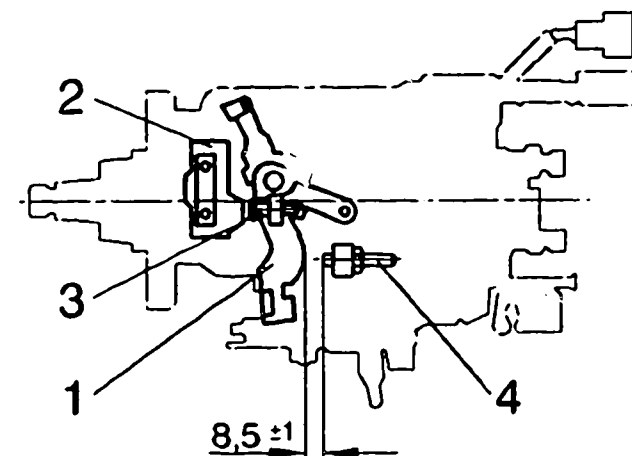


Fig. 14

1 = control lever
 2 = microswitch
 3 = adjustment screw
 4 = idle stop screw



1) Set installation location of V-FICD

1. Stop control lever in the idle position.
2. Set vacuum unit support so that the gap dimension between control lever roller and support bracket equals

$$2 \pm \frac{2}{1} \text{ mm.}$$

2) Set V-FICD travel

1. Move V-FICD across entire operating travel distance.
2. Set the gap dimension between the control lever and the idle stop screw on the adjustment screw at

$$3.4 \pm 1 \text{ mm.}$$

(Control lever angle: 5°)

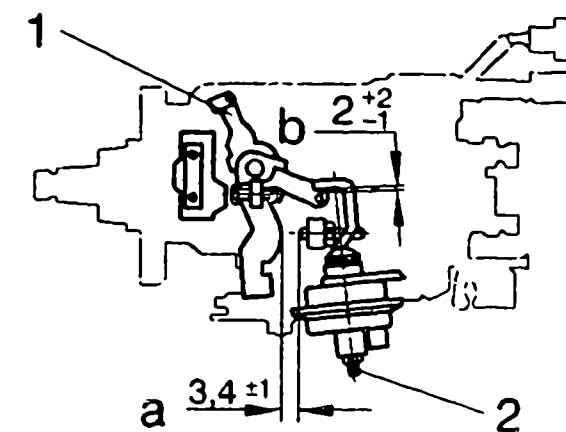


Fig. 15

1 = control lever
 2 = adjustment screw
 a = from idle position
 b = gap dimension inside

● SETTING INSTALLATION LOCATION OF FICD

Set bracket in such a way that gap dimension between the control lever and the FICD bracket equals more than 3 mm.

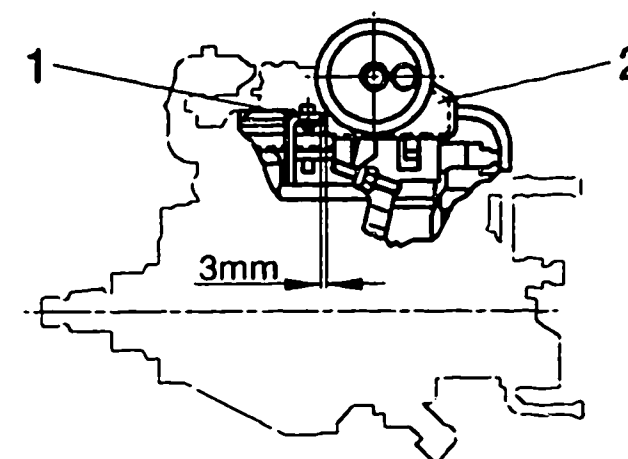


Fig. 16

1 = control lever
 2 = FICD bracket



Test oil:
ISO 4113 oc
SAE J967d

ZEXEL - Test values
Distributor pumps
Engine: R2

1/4
BOSCH no. 9 460 610 306
DKKC no. 104748-0154
Date: 15.4.1988 (0)
Company: MAZDA
No: R201 13 800D

Injection pump no. 104648-0154 (NP-VE4/8F2125RNP207)

Direction of rotation: rear end side clockwise

Prestroke setting: - mm

Test-nozzle holder combination: 1 688 901 000 Test pressure line: 1 680 750 017

1. Setting values		Speed min-1	Setting values	Charge - air pressure - bar (mmHg)	Difference (cc)
1-1	Timing device travel	1250	3,3 - 3,7 (mm)		
1-2	Feed pump pressure	1250	4,9 - 5,5 (kg/cm ²)		
1-3	Full load delivery without charge-air pressure	1500	38,2 - 39,2 (cc/1000 strokes)		2,5
	Full load delivery with charge-air pressure		(cc/1000 strokes)		
1-4	Low-idle speed regulation	350	6,0 - 10,0 (cc/1000 strokes)		2,0
1-5	Start	100	over 42,0 (cc/1000 strokes)		
1-6	Maximum speed regulation	2400	11,1 - 15,1 (cc/1000 strokes)		
1-7	Load-dependent start of delivery	1250	2,7 ± 0,2 (mm)		
1-8					

2. Test values

2-1	Timing device	N = min-1 mm	1250 3,2 - 3,8	1500 4,1 - 5,3	2125 7,0 - 8,2
2-2	Feed pump	N = min-1 kg/cm ²	500 2,7 - 3,3	1250 4,9 - 5,5	2125 7,3 - 7,9
2-3	Overflow rate	N = min-1 cc/10s	1250 49,7 - 93,7		
2-4	Delivery rates				
Control lever position		Speed min-1	Delivery rate (cc/1000 strokes)	Charge-air pressure bar (mmHg)	Difference (cc)
End stop		1500	37,7 - 39,7		
		500	30,7 - 34,7		
		2125	32,0 - 36,0		
		2400	10,1 - 16,1		
		2550	below 4,0		
Shut-off		350	0		
Idle stop		350	6,0 - 10,0		
2-5	Magnet	Cut-in voltage max. 8 V Test voltage 12 - 14 V			

3. Dimensions

K	3,2 - 3,4 mm
KF	5,7 - 5,9 mm
MS	1,4 - 1,6 mm
LDA	- mm

Angle of control lever

α	28,0 - 32,0 angle
A	5,4 - 8,2 mm
β	40,0 - 50,0 angle
B	12,5 - 15,8 mm
Y	- angle
C	- mm

D17

Test values

ZEXEL-Distributor pumps



D18

Test values

ZEXEL-Distributor pumps



1. To set

(1) Stop the control lever at the appropriate spot in accordance with the following conditions.

Charge-air pressure: - mmHg
 Pump speed: 1250 /min
 Injection quantity: $28,2 \pm 1$ cm³/1000 strokes

(2) When the control lever is in the position specified above (1), adjust the governor sleeve so that the timing device travel is as previously stipulated. (Page 1/4).

2. Checking load-dependent start of delivery

Stop the control lever at the appropriate spot in accordance with the following conditions, and check load-dependent start of delivery.

Position of control lever			Prescribed values	
Pump speed (1/min)	Injection quantity (cm ³ /1000 strokes)	Charge-air pressure (mmHg)	Timing device travel (mm)	Reduction of timing device travel (mm)
1250	$28,2 \pm 1,5$	-	$2,7 \pm 0,3$	-
1250	$18,1 \pm 1,5$	-	$1,5 \pm 0,7$	-

D19

Test values
 ZEXEL-Distributor pumps



D20

Test values
 ZEXEL-Distributor pumps



1) Setting the M-KSB stop

1. Fix M-KSB unit temporarily to pump casing.
2. Crank drive shaft at least twice in the direction of rotation of the pump.
3. Crank drive shaft slowly, and lock into position at the point where resistance is felt (roller in the bracket is now laying against the disc cam).
4. Rotate KSB lever in direction of adjustment.
5. Hold KSB lever at the position in which the knuckle bolts are just touching the head of the shaft of the roller bracket (roller bracket - advance angle "0").
6. Set stop in such a way that the gap dimension between the KSB lever and the stop equals
 $0.5 \pm 2 \text{ mm}$.
7. After setting, tighten the fixing screw with the torque prescribed for M-KSB
 $T = 0.6 - 0.9 \text{ kpm}$.

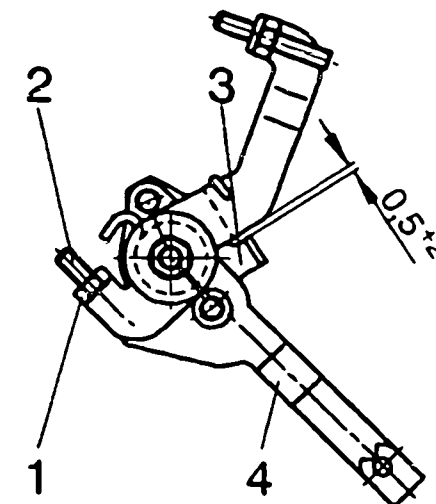


Fig. 17

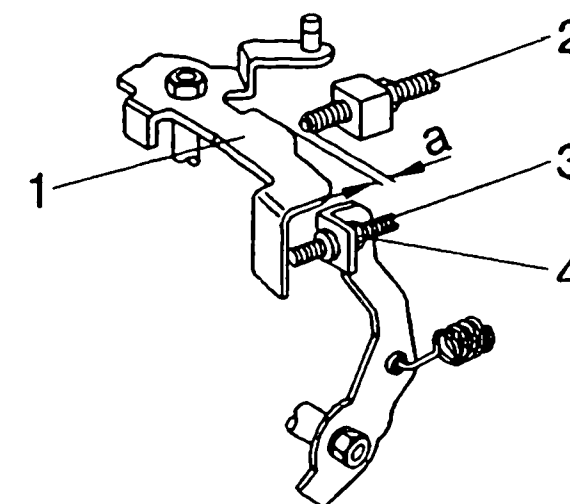
- 1 = nut
2 = adjustment screw
3 = stop
4 = KSB lever

Fig. 18

- 1 = control lever
2 = idle stop screw
3 = FICD screw
4 = nut
a = gauge block

2) Setting the FICD screw

1. Turn KSB lever the other way until it touches the stop.
2. Insert guage block (feeler gauge)
 $4.8 \pm 1 \text{ mm}$
between control lever and idle stop screw (distance from idle position 7°).
3. Set FICD screw in such a way that the control lever and the FICD screw are touching.



Test oil:
ISO 4113 od
SAE J967d

ZEXEL - Test values
Distributor pumps
Engine: R2

1/6
BOSCH no. 9 460 610 307
DKKC no. 104748-0164
Date: 15.4.1988 (0)
Company: MAZDA
No: R202 13 800D

Injection pump no. 104648-0164

(NP-VE4/8F2125RNP208)

Direction of rotation: rear end side clockwise

Prestroke setting: - mm

Test-nozzle holder combination: 1 688 901 000 Test pressure line: 1 680 750 017

1. Setting values		Speed min-1	Setting values	Charge - air pressure - bar (mmHg)	Difference (cc)
1-1	Timing device travel	1250	3,3 - 3,7 (mm)		
1-2	Feed pump pressure	1250	4,9 - 5,5 (kg/cm ²)		
1-3	Full load delivery without charge-air pressure	1500	38,2 - 39,2 (cc/1000 strokes)		2,5
	Full load delivery with charge-air pressure		(cc/1000 strokes)		
1-4	Low-idle speed regulation	350	6,0 - 10,0 (cc/1000 strokes)		2,0
1-5	Start	100	over 42,0 (cc/1000 strokes)		
1-6	Maximum speed regulation	2400	11,1 - 15,1 (cc/1000 strokes)		
1-7	Load-dependent start of delivery	1250	2,7 ± 0,2 (mm)		
1-8					

2. Test values

2-1	Timing device	N = min-1 mm	1250 3, 2-3, 8	1500 4, 1-5, 3	2125 7, 0-8, 2	
2-2	Feed pump	N = min-1 kg/cm ²	500 2, 7-3, 3	1250 4, 9-5, 5	1500 5, 6-6, 2	2125 7, 3-7, 9
2-3	Overflow rate	N = min-1 cc/10s	1250 49, 7 - 93, 7			
2-4 Delivery rates						
Control lever position		Speed min-1	Delivery rate (cc/1000 strokes)	Charge-air pressure bar (mmHg)	Difference (cc)	
End stop		1500	37, 7 - 39, 7			
		500	30, 7 - 34, 7			
		2125	32, 0 - 36, 0			
		2400	10, 1 - 16, 1			
		2550	below 4, 0			
Shut-off		350	0			
Idle stop		350	6, 0 - 10, 0			
2-5 Magnet		Cut-in voltage max. 8 V Test voltage 12 - 14 V				

3. Dimensions

K	3,2 - 3,4 mm
KF	5,7 - 5,9 mm
MS	1,4 - 1,6 mm
LDA	- mm

Angle of control lever

α	28,0 - 32,0 angle
A	5,4 - 8,2 mm
β	40,0 - 50,0 angle
B	12,5 - 15,8 mm
γ	- angle
C	- mm

E1

Test values

ZEXEL-Distributor pumps



E2

Test values

ZEXEL-Distributor pumps



1. To set

(1) Stop the control lever at the appropriate spot in accordance with the following conditions.

Charge-air pressure: - mmHg
 Pump speed: 1250 /min
 Injection quantity: $28,2 \pm 1$ cm³/1000 strokes

(2) When the control lever is in the position specified above (1), adjust the governor sleeve so that the timing device travel is as previously stipulated.

2. Checking load-dependent start of delivery

Stop the control lever at the appropriate spot in accordance with the following conditions, and check load-dependent start of delivery.

Position of control lever			Prescribed values	
Pump speed (1/min)	Injection quantity (cm ³ /1000 strokes)	Charge-air pressure (mmHg)	Timing device travel (mm)	Reduction of timing device travel (mm)
1250	$28,2 \pm 1,5$	-	$2,7 \pm 0,3$	-
1250	$18,1 \pm 1,5$	-	$1,5 \pm 0,7$	-

E3

Test values

ZEXEL-Distributor pumps



E4

Test values

ZEXEL-Distributor pumps



● MOUNTING AND SETTING M-KSB

1) Setting the M-KSB stop

1. Fix M-KSB unit temporarily to pump casing.
2. Crank drive shaft at least twice in the direction of rotation of the pump.
3. Crank drive shaft slowly, and lock into position at the point where resistance is felt (roller in the bracket is now laying against the disc cam).
4. Rotate KSB lever in direction of adjustment.
5. Hold KSB lever at the position in which the knuckle bolts are just touching the head of the shaft of the roller bracket (roller bracket - advance angle "0").
6. Set stop in such a way that the gap dimension between the KSB lever and the stop equals
 $0.5 \pm 2 \text{ mm}$.
7. After setting, tighten the fixing screw with the torque prescribed for M-KSB
 $T = 0.6 - 0.9 \text{ kpm}$.

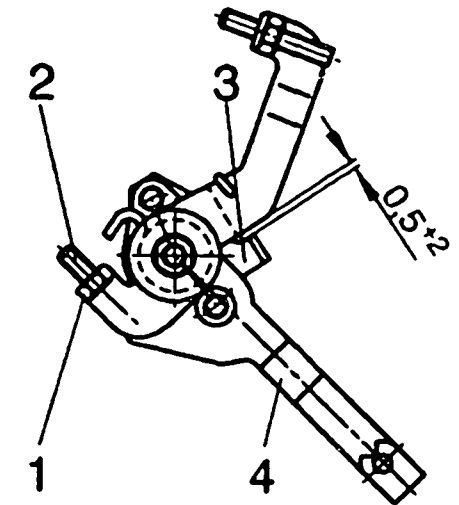


Fig. 19

- 1 = nut
2 = adjustment screw
3 = stop
4 = KSB lever

Fig. 20

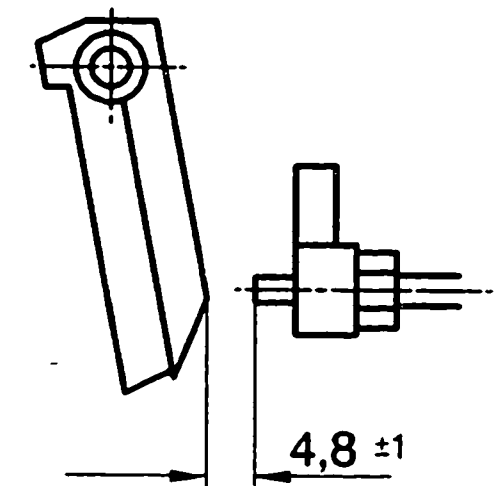
2) Setting the FICD screw

1. Turn KSB lever the other way until it touches the stop.
2. Insert gauge block (feeler gauge)

$$4.8 \pm 1 \text{ mm}$$

between control lever and idle stop screw (distance from idle position 7°).

3. Set FICD screw in such a way that the control lever and the FICD screw are touching.



E5

Test values

ZEXEL-Distributor pumps



E6

Test values

ZEXEL-Distributor pumps



● SETTING MICROSWITCH

1. Position control lever so that the distance between the lever and the idle stop screw equals

$$8.5 \pm 1 \text{ mm}$$

(control lever angle: 12.5°) and lock lever into place.

2. Set adjustment screw so that the microswitch is switched to ON.

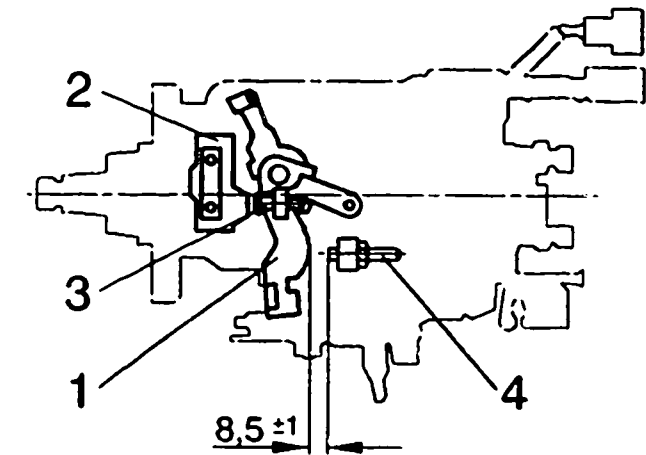


Fig. 21

- 1 = control lever
2 = microswitch
3 = adjustment screw
4 = idle-stop screw

● SETTING V-FICD

- 1) Set installation location of V-FICD

1. Stop control lever in the idle position.
2. Set vacuum unit support so that the gap dimension between control lever roller and support bracket equals

$$2^{+2}_{+1} \text{ mm.}$$

- 2) Set V-FICD travel

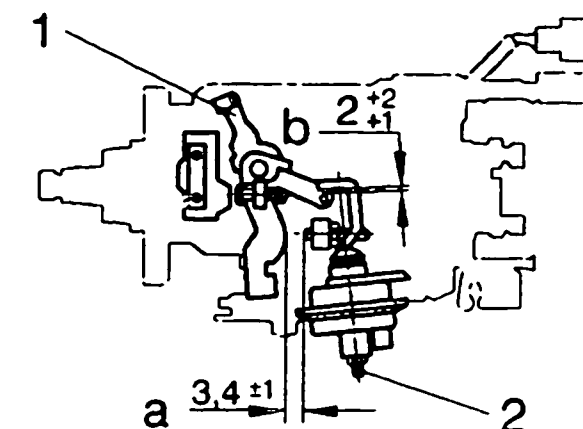
1. Move V-FICD across entire operating travel distance.
2. Set the gap dimension between the control lever and the idle stop screw on the adjustment screw at

$$3.4 \pm 1 \text{ mm.}$$

(Control lever angle: 5°)

Fig. 22

- 1 = control lever
2 = adjustment screw
a = from idle position
b = gap dimension inside



E7

Test values

ZEXEL-Distributor pumps



E8

Test values

ZEXEL-Distributor pumps



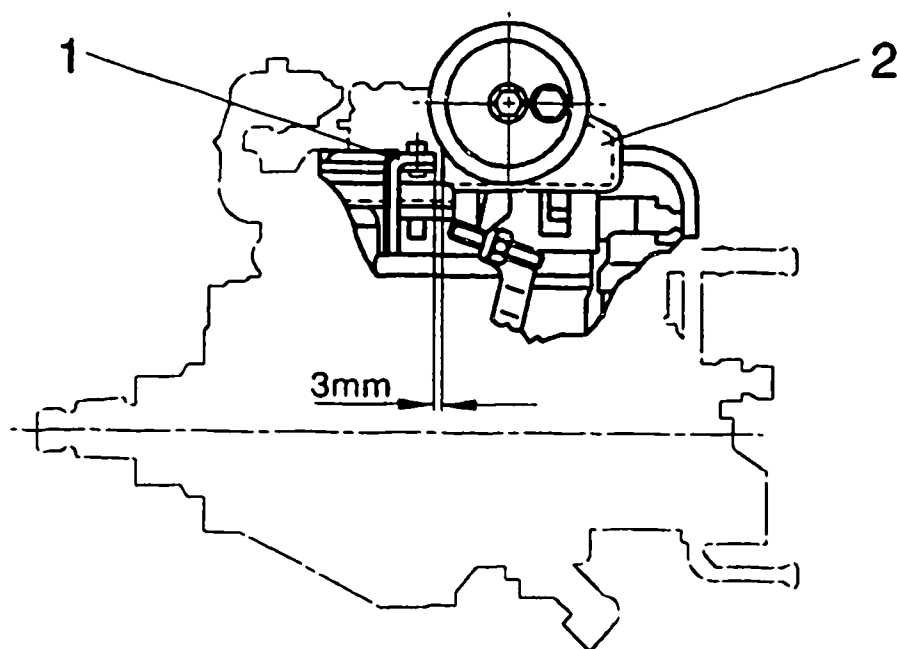


Fig. 23

104748-0164 6/6

- 1 = control lever
- 2 = FICD bracket

● SETTING INSTALLATION LOCATION OF FICD

Set bracket in such a way that gap dimension between the control lever and the FICD bracket equals more than 3 mm.



Test oil:
ISO 4113 od
SAE J967d

ZEXEL - Test values
Distributor pumps
Engine: R2

1/4
BOSCH no. 9 460 610 308
DKKC no. 104748-0183
Date: 15.4.1988 (0)
Company: MAZDA
No: R209 13 800D

Injection pump no. 104648-0193 (NP-VE4/8F2125RNP247)

Direction of rotation: rear end side clockwise

Prestroke setting: - mm

Test-nozzle holder combination: 1 688 901 000 Test pressure line: 1 680 750 017

1. Setting values		Speed min-1	Setting values	Charge - air pressure - bar (mmHg)	Difference (cc)
1-1	Timing device travel	1250	3,3 - 3,7 (mm)		
1-2	Feed pump pressure	1250	4,9 - 5,5 (kg/cm ²)		
1-3	Full load delivery without charge-air pressure	1500	38,2 - 39,2 (cc/1000 strokes)		2,5
	Full load delivery with charge-air pressure		(cc/1000 strokes)		
1-4	Low-idle speed regulation	350	6,0 - 10,0 (cc/1000 strokes)		2,0
1-5	Start	100	over 42,0 (cc/1000 strokes)		
1-6	Maximum speed regulation	2400	11,1 - 15,1 (cc/1000 strokes)		
1-7	Load-dependent start of delivery	1250	2,7 ± 0,2 (mm)		
1-8					

2. Test values

2-1	Timing device	N = min-1 mm	1250 3,2 - 3,8	1500 4,1 - 5,3	2125 7,0 - 8,2
2-2	Feed pump	N = min-1 kg/cm ²	500 2,7 - 3,3	1250 4,9 - 5,5	2125 7,3 - 7,9
2-3	Overflow rate	N = min-1 cc/10s	1250 49,7 - 93,7		
2-4	Delivery rates				
Control lever position		Speed min-1	Delivery rate (cc/1000 strokes)	Charge-air pressure bar (mmHg)	Difference (cc)
End stop		1500	37,7 - 39,7		
		500	30,7 - 34,7		
		2125	32,0 - 36,0		
		2400	10,1 - 16,1		
		2550	below 4,0		
Shut-off		350	0		
Idle stop		350	6,0 - 10,0		
2-5	Magnet	Cut-in voltage max. 8 V Test voltage 12 - 14 V			

3. Dimensions

K	3,2 - 3,4 mm
KF	5,7 - 5,9 mm
MS	1,4 - 1,6 mm
LDA	- mm

Angle of control lever

α	28,0 - 32,0 angle
A	5,4 - 8,2 mm
β	40,0 - 50,0 angle
B	12,5 - 15,8 mm
γ	- angle
C	- mm

E10

Test values

ZEXEL-Distributor pumps



E11

Test values

ZEXEL-Distributor pumps



1. To set

(1) Stop the control lever at the appropriate spot in accordance with the following conditions.

Charge-air pressure: - mmHg
 Pump speed: 1250 /min
 Injection quantity: $28,2 \pm 1$ cm³/1000 strokes

(2) When the control lever is in the position specified above (1), adjust the governor sleeve so that the timing device travel is as previously stipulated. (Page 1 / 4).

2. Checking load-dependent start of delivery

Stop the control lever at the appropriate spot in accordance with the following conditions, and check load-dependent start of delivery.

Position of control lever			Prescribed values	
Pump speed (1/min)	Injection quantity (cm ³ /1000 strokes)	Charge-air pressure (mmHg)	Timing device travel (mm)	Reduction of timing device travel (mm)
1250	$28,2 \pm 1,5$	-	$2,7 \pm 0,3$	-
1250	$18,1 \pm 1,5$	-	$1,5 \pm 0,7$	-

E12

Test values

ZEXEL-Distributor pumps



E13

Test values

ZEXEL-Distributor pumps



1) Setting the M-KSB stop

1. Fix M-KSB unit temporarily to pump casing.
2. Crank drive shaft at least twice in the direction of rotation of the pump.
3. Crank drive shaft slowly, and lock into position at the point where resistance is felt (roller in the bracket is now laying against the disc cam).
4. Rotate KSB lever in direction of adjustment.
5. Hold KSB lever at the position in which the knuckle bolts are just touching the head of the shaft of the roller bracket (roller bracket - advance angle "0").
6. Set stop in such a way that the gap dimension between the KSB lever and the stop equals
 $0.5 \pm 2 \text{ mm}$.
7. After setting, tighten the fixing screw with the torque prescribed for M-KSB
 $T = 0.6 - 0.9 \text{ kpm}$.

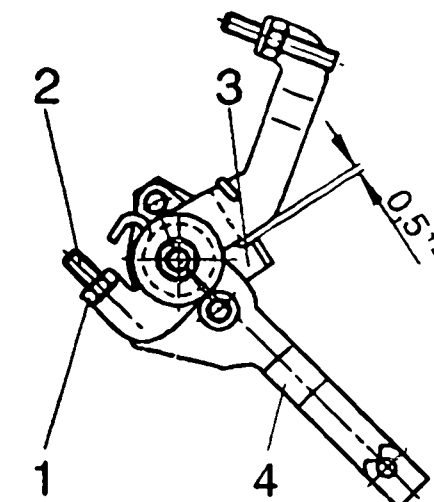
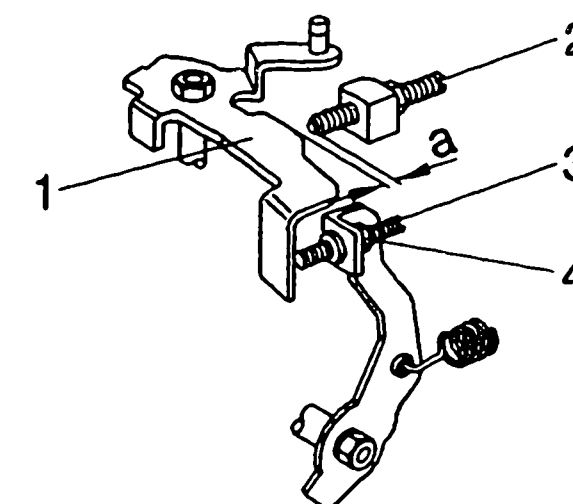


Fig. 24

- 1 = nut
2 = adjustment screw
3 = stop
4 = KSB lever

Fig. 25

- 1 = control lever
2 = idle stop screw
3 = FICD screw
4 = nut
a = gauge block



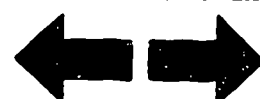
2) Setting the FICD screw

1. Turn KSB lever the other way until it touches the stop.
2. Insert gauge block (feeler gauge)

$$4.8 \pm 1 \text{ mm}$$

between control lever and idle stop screw (distance from idle position 7°).

3. Set FICD screw in such a way that the control lever and the FICD screw are touching.



Test oil:
ISO 4113 od
SAE 3967d

ZEXEL - Test values
Distributor pumps
Engine: RF

1/4
BOSCH no. 9 460 610 311
DKKC no. 104748-0344
Date: 15.4.1988 (0)
Company: MAZDA
No: RF79 13 800B

Injection pump no. 104648-0354 (NP-VE4/8F2325RNP580)

Direction of rotation: rear end side clockwise

Prestroke setting:

Test-nozzle holder combination: 1 688 901 000 Test pressure line: 1 680 750 017

1. Setting values		Speed min-1	Setting values	Charge - air pressure - bar (mmHg)	Difference (cc)
1-1	Timing device travel	1375	4,0 - 4,4 (mm)		
1-2	Feed pump pressure	1375	4,4 - 5,0 (kg/cm ²)		
1-3	Full load delivery without charge-air pressure	1375	35,4 - 36,4 (cc/1000 strokes)		2,5
	Full load delivery with charge-air pressure		(cc/1000 strokes)		
1-4	Low-idle speed regulation	360	9,0 - 11,0 (cc/1000 strokes)		2,0
1-5	Start	100	over 42,0 (cc/1000 strokes)		
1-6	Maximum speed regulation	2600	10,8 - 14,8 (cc/1000 strokes)		
1-7	Load-dependent start of delivery	1375	3,4 - 3,8 (mm)		
1-8					

2. Test values

2-1	Timing device	N = min-1 mm	1375 1800 2325 3,9-4,5 6,1-7,3 7,2-8,4		
2-2	Feed pump	N = min-1 kg/cm ²	600 1375 1800 2325 2,2-2,8 4,4-5,0 5,6-6,2 6,9-7,5		
2-3	Overflow rate	N = min-1 cc/10s	1375 46,3-90,3		
2-4 Delivery rates					
Control lever position		Speed min-1	Delivery rate (cc/1000 strokes)	Charge-air pressure bar (mmHg)	Difference (cc)
End stop		1375	34,9 - 36,9		
		600	29,0 - 33,0		
		2325	30,2 - 34,2		
		2600	9,8 - 15,8		
		2700	below 6,0		
Shut-off		360	0		
Idle stop		360	8,0 - 12,0		
2-5 Magnet		Cut-in voltage max. 8 V Test voltage 12 - 14 V			

3. Dimensions

K	3,2 - 3,4 mm
KF	5,7 - 5,9 mm
MS	1,4 - 1,6 mm
LDA	- mm

Angle of control lever

α	21,0 - 29,0 angle
A	8,8 - 14,1 mm
β	40,0 - 50,0 angle
B	12,7 - 16,0 mm
Y	- angle
C	- mm

E16

Test values
ZEXEL-Distributor pumps



E17

Test values
ZEXEL-Distributor pumps



1. To set

(1) Stop the control lever at the appropriate spot in accordance with the following conditions.

Charge-air pressure: - mmHg
 Pump speed: 1375 /min
 Injection quantity: $28,2 \pm 1$ cm³/1000 strokes

(2) When the control lever is in the position specified above (1), adjust the governor sleeve so that the timing device travel is as previously stipulated. (Page 1/4).

2. Checking load-dependent start of delivery

Stop the control lever at the appropriate spot in accordance with the following conditions, and check load-dependent start of delivery.

Position of control lever			Prescribed values	
Pump speed (1/min)	Injection quantity (cm ³ /1000 strokes)	Charge-air pressure (mmHg)	Timing device travel (mm)	Reduction of timing device travel (mm)
1375	$28,2 \pm 1,5$	-	$3,6 \pm 0,3$	-
1375	$16,1 \pm 1,5$	-	$2,4 \pm 0,7$	-

E18

Test values

ZEXEL-Distributor pumps



E19

Test values

ZEXEL-Distributor pumps



● SETTING SIDE CONNECTING LEVER

104748-0344 3/4

1. Clamp control lever in idle position.
2. Set rod (1) in such a way that the dimension for the pin equals $5.8 - 0.2$ mm (between the side connecting lever and the angle bracket).
After this, tighten lock nut.

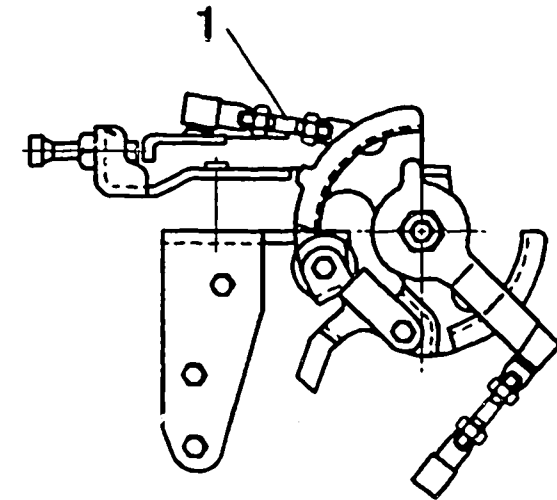
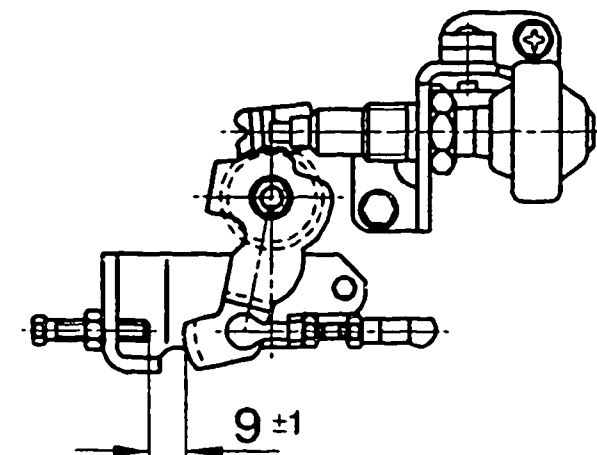


Fig. 26

● SETTING DAMPER

1. Insert gauge block (feeler gauge) 9 ± 1 mm between control lever and idle screw.
(Control lever angle: 13°)
2. Set damper-adjustment screw in such a way that the damper-adjustment screw and the tappet are touching.
Tighten the nut securely.

Fig. 27



E20

Test values

ZEXEL-Distributor pumps



E21

Test values

ZEXEL-Distributor pumps



1. Setting the timing device stroke

- (1) Calculate the timing device stroke (fig. 29) according to the ambient temperature during adjustment.
- (2) Set stroke with the timing device stroke-adjustment screw (1), so that it agrees with the calculation (see below).

2. Setting W - raised idling

- (1) Adjust the adjustment screw (2) until there is a distance of 12.3 ± 0.5 mm between the control lever and the idle stop screw.

3. Setting the control lever angle

- (1) Calculate the control lever angle (ℓ - dimension) as shown in fig. 29, according to the air temperature during adjustment.
- (2) Adjust the control lever angle (ℓ - dimension) with adjustment screw (3).

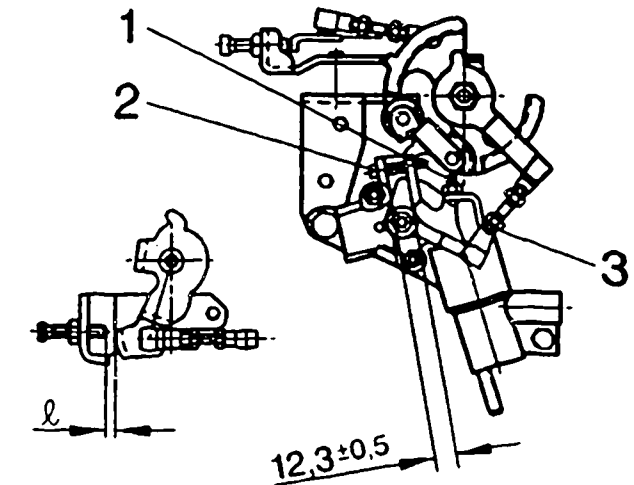


Fig. 28

Fig. 29

a = air temperature (°C)
b = timing device travel (TA) mm
c = gap dimension of control lever/idle-stop screw (ℓ)

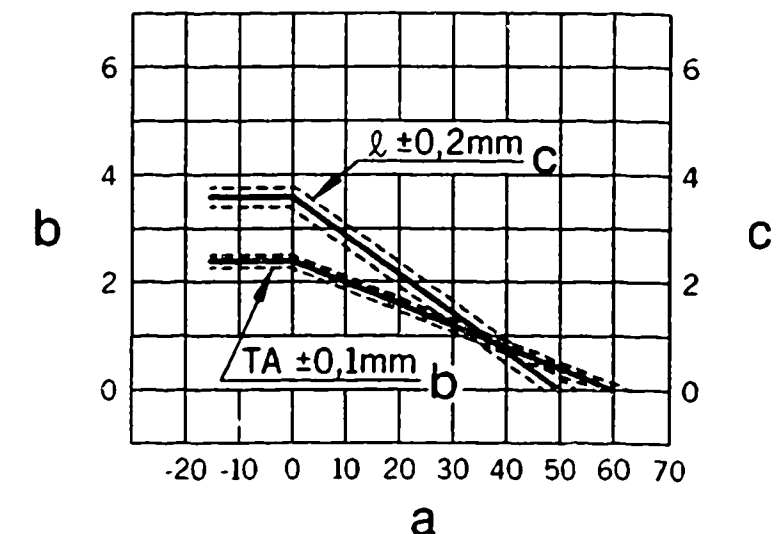
Calculation formula (Fig. 29)

Timing device travel:

$$TA = -0.04 t + 2.4 \quad (t \geq 0^\circ\text{C})$$

Control lever angle:

$$\ell = -0.072 t + 3.6 \quad (t \geq 0^\circ\text{C})$$



Test oil:
ISO 4113 od
SAE J967d

ZEXEL - Test values
Distributor pumps
Engine: RFX

1/4
BOSCH no. 9 460 610 309
DKKC no. 104749-0344
Date: 15.4.1988 (0)
Company: MAZDA
No: RF71 13 800C

Injection pump no. 104649-0354 (NP-VE4/9F2150RNP556)

Direction of rotation: rear end side clockwise

Prestroke setting: 0,28 - 0,32 mm

Test-nozzle holder combination: 1 688 901 000 Test pressure line: 1 680 750 017

1. Setting values		Speed min-1	Setting values	Charge - air pressure - bar (mmHg)	Difference (cc)
1-1	Timing device travel	1500	T = 4,4 - 4,8 (mm)	640 - 660	
1-2	Feed pump pressure	1500	5,2 - 5,8 (kg/cm ²)	640 - 660	
1-3	Full load delivery without charge-air pressure	1000	49,4 - 50,4 (cc/1000 strokes)	640 - 660	4,0
	Full load delivery with charge-air pressure	1000	44,3 - 45,3 (cc/1000 strokes)	290 - 310	3,5
1-4	Low-idle speed regulation	360	8,1 - 10,1 (cc/1000 strokes)	0	2,0
1-5	Start	100	over 55,0 (cc/1000 strokes)	0	
1-6	Maximum speed regulation	2250	33,2 - 37,2 (cc/1000 strokes)	640 - 660	
1-7	Load-dependent start of delivery	1500	T = 0,2 - 0,6 (mm)	640 - 660	
1-8					

2. Test values

2-1	Timing device	N = min-1 mm	1250 2,7 - 3,9	1500 4,3 - 4,9	2150 7,6 - 8,8
2-2	Feed pump	N = min-1 kg/cm ²	1250 4,5 - 5,1	1500 5,2 - 5,8	2150 6,8 - 7,4
2-3	Overflow rate	N = min-1 cc/10s	1000 41,0 - 85,0		
2-4	Delivery rates				
Control lever position		Speed min-1	Delivery rate (cc/1000 strokes)	Charge-air pressure bar (mmHg)	Difference (cc)
End stop		1000	48,9 - 50,9	640 - 660	
		600	33,9 - 38,9	0	
		2150	39,7 - 44,7	640 - 660	
		2250	32,7 - 37,7	640 - 660	
		2550	8,0 - 15,0	640 - 660	
		2700	below 3,0	640 - 660	
		1000	43,8 - 45,8	290 - 310	
Shut-off		360	0	0	
Idle stop		450	below 3,0	0	
		360	7,6 - 10,6	0	
2-5	Magnet	Cut-in voltage max. 8 V Test voltage 12 - 14 V			

3. Dimensions

K	3,2 - 3,4	mm
KF	5,7 - 5,9	mm
MS	1,6 - 1,8	mm
LDA	3,9 - 4,1	mm

Angle of control lever

α	21,0 - 29,0	angle
A	8,8 - 14,1	mm
β	39,0 - 45,0	angle
B	12,0 - 13,9	mm
Y	-	angle
C	-	mm

F1

Test values

ZEXEL-Distributor pumps



F2

Test values

ZEXEL-Distributor pumps



● Note:

When checking the timing device travel and feed pump pressure, apply charge-air pressure of 640 - 660 mmHg to the charge-air pressure chamber.

● SETTING LOAD-DEPENDENT START OF DELIVERY

1. To set

(1) Stop the control lever at the appropriate spot in accordance with the following conditions.

Charge-air pressure:	640 - 660	mmHg
Pump speed:	1500	/min
Injection quantity:	38,2 \pm 0,5	cm ³ /1000 strokes

(2) When the control lever is in the position specified above (1), adjust the governor sleeve so that the timing device travel is as previously stipulated. (Page 1/4).

2. Checking load-dependent start of delivery

Stop the control lever at the appropriate spot in accordance with the following conditions, and check load-dependent start of delivery.

Position of control lever			Prescribed values	
Pump speed (1/min)	Injection quantity (cm ³ /1000 strokes)	Charge-air pressure (mmHg)	Timing device travel (mm)	Reduction of timing device travel (mm)
1500	37,2 - 39,2	640 - 660	-	0,1 - 0,7
1500	32,2 - 34,2	640 - 660	-	0,4 - 1,2

F3

Test values

ZEXEL-Distributor pumps



F4

Test values

ZEXEL-Distributor pumps



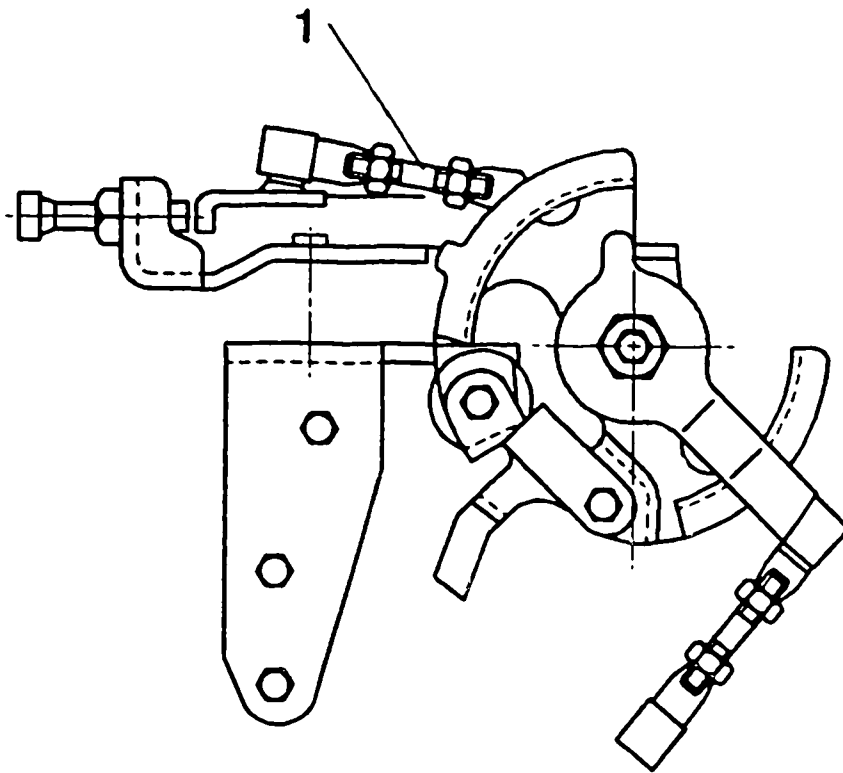


Fig. 30

104749-0344 3/4

● SETTING SIDE CONNECTING LEVER

1. Clamp control lever in idle position.
2. Set rod (1) in such a way that the dimension for the pin equals

5,8 - 0,2 mm

(between the side connecting lever and the angle bracket).

After this, tighten lock nut.



● SETTING W-KSB

104749-0344 4/4

1. Setting the timing device stroke

- (1) Calculate the timing device stroke (fig. 32) according to the ambient temperature during adjustment.
- (2) Set stroke with the timing device stroke-adjustment screw (1), so that it agrees with the calculation (see below).

2. Setting W - raised idling

- (1) Adjust the adjustment screw (2) until there is a distance of 12.3 ± 0.5 mm between the control lever and the idle stop screw.

3. Setting the control lever angle

- (1) Calculate the control lever angle (ℓ - dimension) as shown in fig. 32, according to the air temperature during adjustment.
- (2) Adjust the control lever angle (ℓ - dimension) with adjustment screw (3).

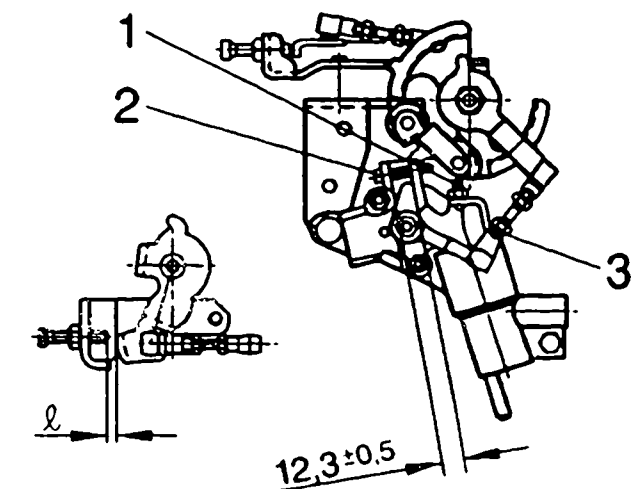


Fig. 31

Fig. 32

a = air temperature (°C)
b = timing device travel (TA) mm
c = gap dimension of control lever/idle-stop screw (ℓ)

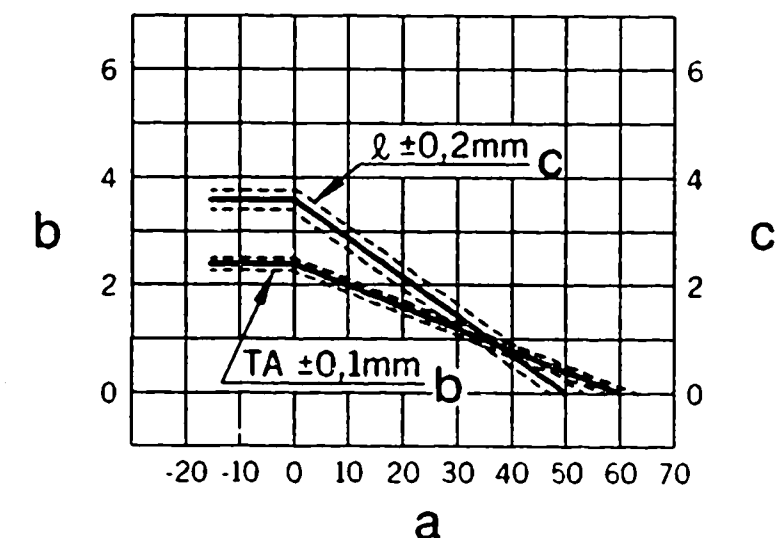
Calculation formula (Fig. 32)

Timing device travel:

$$TA = -0.04 t + 2.4 \quad (t \geq 0^\circ\text{C})$$

Control lever angle:

$$\ell = -0.072 t + 3.6 \quad (t \geq 0^\circ\text{C})$$



F6

Test values

ZEXEL-Distributor pumps



F7

Test values

ZEXEL-Distributor pumps



Test oil:
ISO 4113 od
SAE J967d

ZEXEL - Test values
Distributor pumps
Engine: RFX

1/4
BOSCH no. 9 460 610 310
DKKC no. 104749-0354
Date: 15.4.1988 (0)
Company: MAZDA
No: RF72 13 800D

Injection pump no. 104649-0364 (NP-VE4/9F2150RNP557)

Direction of rotation: rear end side clockwise

Prestroke setting: 0,28 - 0,32 mm

Test-nozzle holder combination: 1 688 901 000 Test pressure line: 1 680 750 017

1. Setting values		Speed min-1	Setting values	Charge - air pressure - bar (mmHg)	Difference (cc)
1-1	Timing device travel	1500	T = 4,4 - 4,8 (mm)	640 - 660	
1-2	Feed pump pressure	1500	5,2 - 5,8 (kg/cm ²)	640 - 660	
1-3	Full load delivery without charge-air pressure	1000	49,4 - 50,4 (cc/1000 strokes)	640 - 660	4,0
	Full load delivery with charge-air pressure	1000	44,3 - 45,3 (cc/1000 strokes)	290 - 310	3,5
1-4	Low-idle speed regulation	415	11,1 - 13,1 (cc/1000 strokes)	0	2,0
1-5	Start	100	over 55,0 (cc/1000 strokes)	0	
1-6	Maximum speed regulation	2250	33,2 - 37,2 (cc/1000 strokes)	640 - 660	
1-7	Load-dependent start of delivery	1500	T = 0,2 - 0,6 (mm)	640 - 660	
1-8					

2. Test values

2-1	Timing device	N = min-1 mm	1250 2,7 - 3,9	1500 4,3 - 4,9	2150 7,6 - 8,8
2-2	Feed pump	N = min-1 kg/cm ²	1250 4,5 - 5,1	1500 5,2 - 5,8	2150 6,8 - 7,4
2-3	Overflow rate	N = min-1 cc/10s	1000 41,0 - 85,0		
2-4	Delivery rates				
Control lever position		Speed min-1	Delivery rate (cc/1000 strokes)	Charge-air pressure bar (mmHg)	Difference (cc)
End stop		1000	48,9 - 50,9	640 - 660	
		600	33,9 - 38,9	0	
		2150	39,7 - 44,7	640 - 660	
		2250	32,7 - 37,7	640 - 660	
		2550	8,0 - 15,0	640 - 660	
		2700	below 3,0	640 - 660	
		1000	43,8 - 45,8	290 - 310	
Shut-off		415	0	0	
Idle stop		500	below 3,0	0	
		415	10,6 - 13,6	0	
2-5 Magnet		Cut-in voltage max. 8 V Test voltage 12 - 14 V			

3. Dimensions

K	3,2 - 3,4	mm
KF	5,7 - 5,9	mm
MS	1,6 - 1,8	mm
LDA	3,9 - 4,1	mm

Angle of control lever

α	21,0 - 29,0	angle
A	8,8 - 14,1	mm
β	38,0 - 44,0	angle
B	12,0 - 13,9	mm
Y	-	angle
C	-	mm

F8

Test values

ZEXEL-Distributor pumps



F9

Test values

ZEXEL-Distributor pumps



● Note:

When checking the timing device travel and feed pump pressure, apply charge-air pressure of 640 - 660 mmHg to the charge-air pressure chamber.

● SETTING LOAD-DEPENDENT START OF DELIVERY

1. To set

(1) Stop the control lever at the appropriate spot in accordance with the following conditions.

Charge-air pressure:	640 - 660	mmHg
Pump speed:	1500	/min
Injection quantity:	38,2 \pm 0,5	cm ³ /1000 strokes

(2) When the control lever is in the position specified above (1), adjust the governor sleeve so that the timing device travel is as previously stipulated. (Page 1/4).

2. Checking load-dependent start of delivery

Stop the control lever at the appropriate spot in accordance with the following conditions, and check load-dependent start of delivery.

Position of control lever			Prescribed values	
Pump speed (l/min)	Injection quantity (cm ³ /1000 strokes)	Charge-air pressure (mmHg)	Timing device travel (mm)	Reduction of timing device travel (mm)
1500	37,2 - 39,2	640 - 660	-	0,1 - 0,7
1500	32,2 - 34,2	640 - 660	-	0,4 - 1,2

F10

Test values

ZEXEL-Distributor pumps



F11

Test values

ZEXEL-Distributor pumps



● SETTING SIDE CONNECTING LEVER

104749-0354 3/4

1. Clamp control lever in idle position.

2. Set rod (1) in such a way that the dimension for the pin equals 5.8 - 0.2 mm (between the side connecting lever and the angle bracket).
Then tighten lock nut.

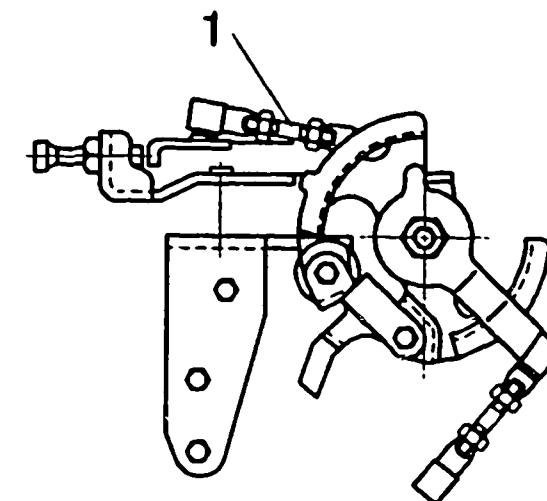


Fig. 33

● SETTING POTENTIOMETER

Setting conditions			Prescribed value	
Control lever position	Pump speed (1/min)	Injection qty. (cm ³ /1000 strokes)	Setting value for output voltage (V)	Remarks
Test				Setting point
Idle			1.6 ± 0.03	Setting point
Maximum speed			8.43 ± 0.7	Test point

(Input voltage 10V)

F12

Test values
ZEXEL-Distributor pumps



F13

Test values
ZEXEL-Distributor pumps



1. Setting the timing device stroke

- (1) Calculate the timing device stroke (fig. 35) according to the ambient temperature during adjustment.
- (2) Set stroke with the timing device stroke-adjustment screw (1), so that it agrees with the calculation (see below).

2. Setting W - raised idling

- (1) Adjust the adjustment screw (2) until there is a distance of 12.3 ± 0.5 mm between the control lever and the idle stop screw.

3. Setting the control lever angle

- (1) Calculate the control lever angle (ℓ - dimension) as shown in fig. 35, according to the air temperature during adjustment.
- (2) Adjust the control lever angle (ℓ - dimension) with adjustment screw (3).

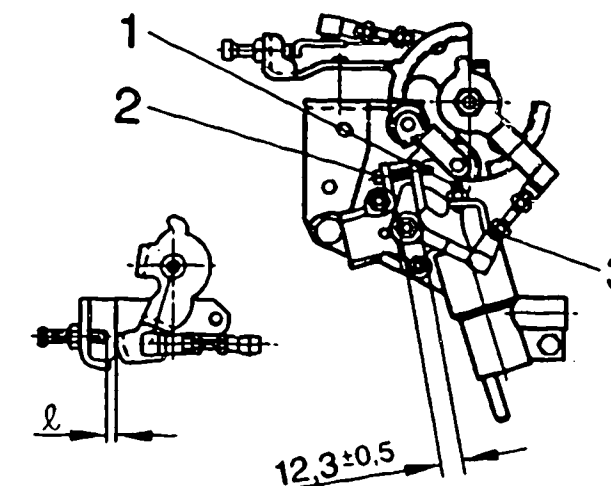


Fig. 34

Fig. 35

a = air temperature (°C)
b = timing device travel (TA) mm
c = gap dimension of control lever/idle-stop screw (ℓ)

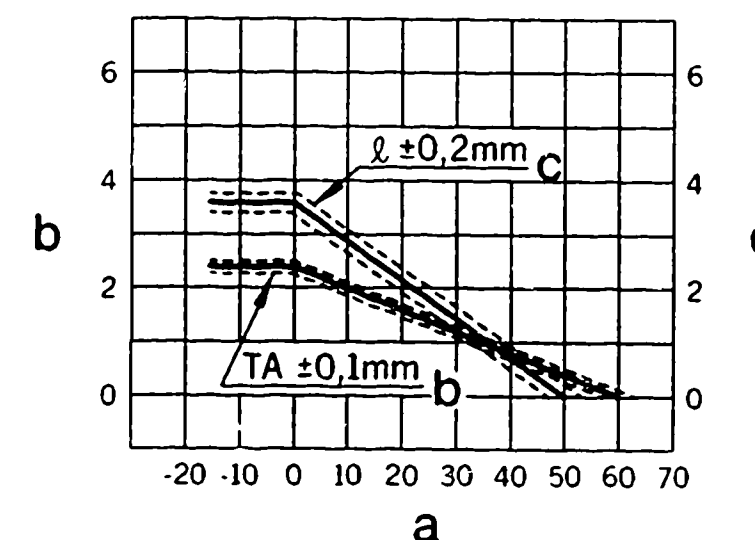
Calculation formula (Fig. 35)

Timing device travel:

$$TA = -0.04 t + 1.6 \quad (t \geq 0^\circ\text{C})$$

Control lever angle:

$$\ell = -0.072 t + 3.6 \quad (t \geq 0^\circ\text{C})$$



Test oil:
ISO 4113 od
SAE J967d

ZEXEL - Test values
Distributor pumps
Engine: C223

BOSCH no. 9 460 610 274
DKKC no. 104749-1141
Date: 15.4.1988 (0)
Company: ISUZU
No: 894241 6833

Injection pump no. 104649-1151

(NP-VE4/9F2175LNP72)

Direction of rotation: rear end side clockwise

Prestroke setting: - mm

Test-nozzle holder combination: 1 688 901 000 Test pressure line: 1 680 750 017

1. Setting values		Speed min-1	Setting values	Charge - air pressure - bar (mmHg)	Difference (cc)
1-1	Timing device travel	1500	3,8 - 4,2 (mm)		
1-2	Feed pump pressure	1500	5,2 - 5,6 (kg/cm ²)		
1-3	Full load delivery without charge-air pressure	1500	40,1 - 41,1 (cc/1000 strokes)		3,0
	Full load delivery with charge-air pressure		(cc/1000 strokes)		
1-4	Low-idle speed regulation	350	5,5 - 9,5 (cc/1000 strokes)		2,0
1-5	Start	100	over 63,0 (cc/1000 strokes)		
1-6	Maximum speed regulation	2175	10,4 - 16,4 (cc/1000 strokes)		
1-7	Load-dependent start of delivery				
1-8					

2. Test values

2-1	Timing device	N = min-1 mm	1000 1,4 - 2,6	1500 3,7 - 4,3	2175 6,1 - 7,0
2-2	Feed pump	N = min-1 kg/cm ²	1000 3,8 - 4,4	1500 5,2 - 5,6	2175 6,6 - 7,2
2-3	Overflow rate	N = min-1 cc/10s	1000 52,0 - 95,0		
2-4	Delivery rates				
Control lever position		Speed min-1	Delivery rate (cc/1000 strokes)	Charge-air pressure bar (mmHg)	Difference (cc)
End stop		2550	below 6,0		
		2440	10,4 - 16,4		
		2175	34,7 - 38,7		
		1500	39,6 - 41,6		
		600	30,0 - 34,0		
Shut-off		350	0		
Idle stop		350	5,5 - 9,5		
		450	below 3,0		
2-5	Magnet	Cut-in voltage max. 8 V Test voltage 12 - 14 V			

3. Dimensions

K	3,2 - 3,4 mm
KF	5,7 - 5,9 mm
MS	1,7 - 1,9 mm
LDA	- mm

Angle of control lever

α	21,0 - 29,0 angle
A	2,8 - 8,0 mm
β	36,5 - 46,5 angle
B	10,5 - 14,5 mm
γ	- angle
C	- mm

F16

Test values

ZEXEL-Distributor pumps



F17

Test values

ZEXEL-Distributor pumps



Test oil:
ISO 4113 od
SAE J967d

ZEXEL - Test values
Distributor pumps
Engine: LD28

1/4
BOSCH no. 9 460 610 292
DKKC no. 104769-2026
Date: 15.4.1988 (0)
Company: NISSAN
No: 16700 V5710

Injection pump no. 104669-2026 (NP-VE6/9F2500RNP21)

Direction of rotation: rear end side clockwise

Prestroke setting: - mm

Test-nozzle holder combination: 1 688 901 000 Test pressure line: 1 680 750 017

1. Setting values		Speed min-1	Setting values	Charge - air pressure - bar (mmHg)	Difference (cc)
1-1	Timing device travel	900	T=2,0 - 2,6 (mm)	2,5	
1-2	Feed pump pressure	900	3,5 - 4,1 (kg/cm ²)		
1-3	Full load delivery without charge-air pressure	900	29,0 - 30,0 (cc/1000 strokes)		
	Full load delivery with charge-air pressure		(cc/1000 strokes)		
1-4	Low-idle speed regulation	350	6,3 - 9,3 (cc/1000 strokes)		
1-5	Start	100	40,8 - 48,8 (cc/1000 strokes)		
1-6	Maximum speed regulation	2600	15,5 - 21,5 (cc/1000 strokes)		
1-7	Load-dependent start of delivery	900	T=0,2 - 0,8 (mm)		
1-8			(0,8 - 10,0 cc/1000 strokes)		

2. Test values

2-1	Timing device	N = min-1 mm	900 1,9 - 2,7	1200 3,5 - 4,7	2300 8,1 - 9,0
2-2	Feed pump	N = min-1 kg/cm ²	900 3,4 - 4,2	1800 5,5 - 6,3	2500 7,2 - 8,0
2-3	Overflow rate	N = min-1 cc/10s	900 43,0 - 87,0		
2-4	Delivery rates				
Control lever position		Speed min-1	Delivery rate (cc/1000 strokes)	Charge-air pressure bar (mmHg)	Difference (cc)
End stop		900	28,5 - 30,5		
		600	27,0 - 31,0		
		2300	28,8 - 32,8		
		2600	15,0 - 22,0		
		2800	below 5,0		
Shut-off		350	0		
Idle stop		350	5,8 - 9,8		2,0
		500	below 4,0		
Part load		900	2,1 - 12,1		
2-5	Magnet	Cut-in voltage max. 12 V Test voltage V			

3. Dimensions

K	3,2 - 3,4 mm
KF	6,54 - 6,74 mm
MS	1,7 - 1,9 mm
LDA	- mm

Angle of control lever

α	21,0 - 29,0 angle
A	2,5 - 8,0 mm
β	39,0 - 49,0 angle
B	11,0 - 16,0 mm
Y	10,5 - 11,5 angle
C	6,7 - 7,3 mm

F18

Test values

ZEXEL-Distributor pumps



F19

Test values

ZEXEL-Distributor pumps



****Setting the stop lever starting delivery****

Set the above so that the starting injection delivery lies within the specified range
(Page 1/4).

Tighten the adjustment screw for the starting delivery of the stop lever.

Setting the W-CSD (KSB) test point				
Timing device stroke	Water temp. °C	U/min	mm	Base
	50		0	
	+0.5°		0.55 ± 0.2	Base
	20 -			
	-10		1.65	
F.I.C.D. lever angle	Water temp. °C	U/min	Degree	Base
	50		0	
	+0.5°		+ 0.5°	Base
	20 -		2-	
	-10		(6)	



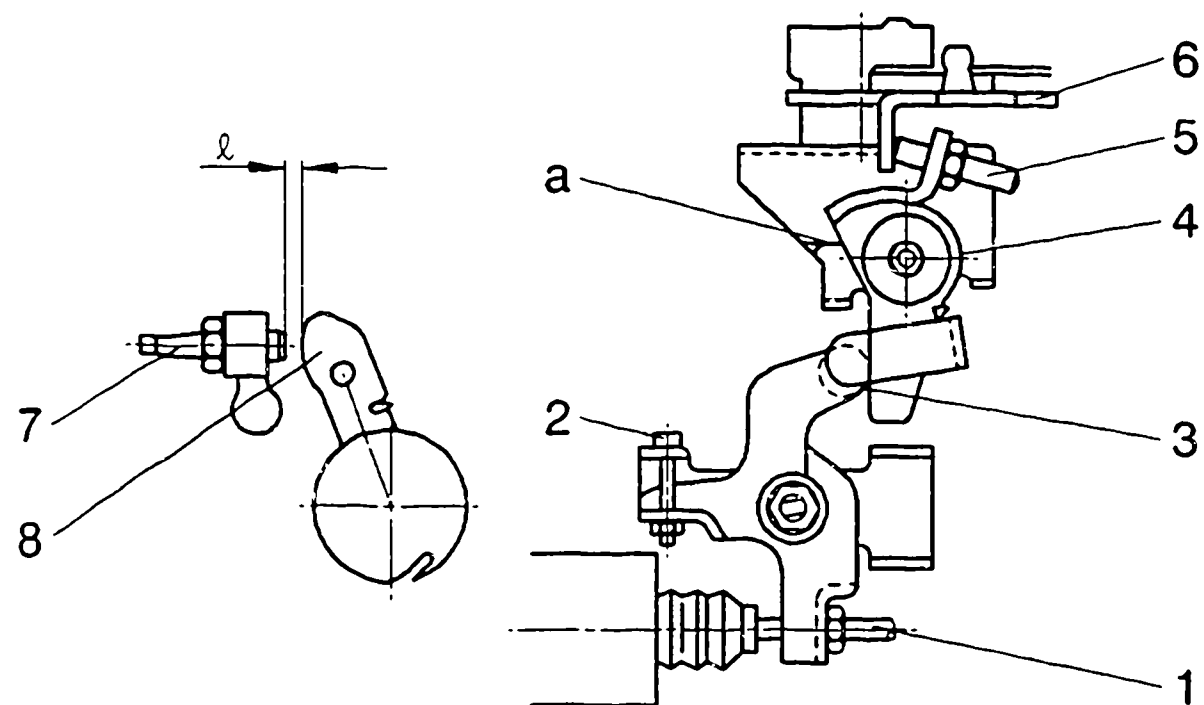


Fig. 36

a = Testing of standard line is not necessary

Fig. 37

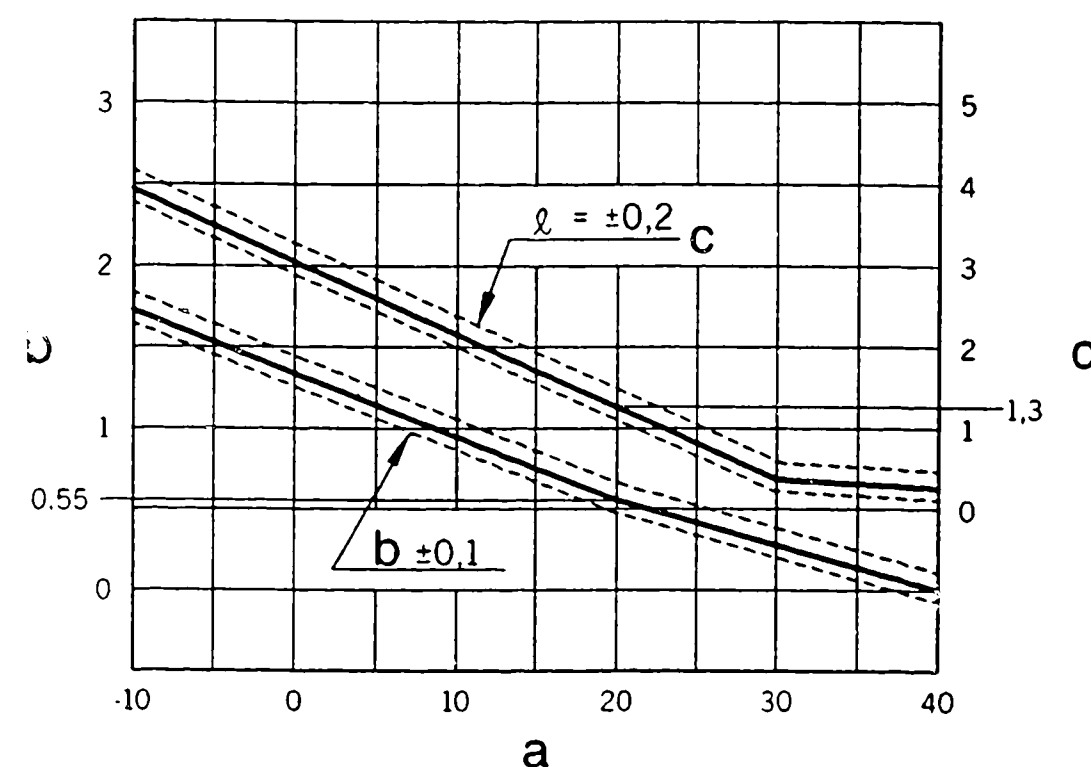


Fig. 38

104769-2026 3/4

a = temperature (°C)
b = timing device travel (mm)
c = measurement: l mm
(tolerance between control lever and idle stop screw)

● SETTING THE W-CSD (KSB)

1. Setting the timing device travel (see fig. 38)

Set travel of timing device with the screw (1) in such a way that the timing device lift conforms to the values contained in the diagram (fig. 38).

F21

Test values

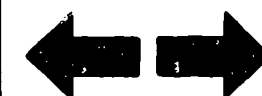
ZEXEL-Distributor pumps



F22

Test values

ZEXEL-Distributor pumps



2. Setting the intermediate lever position (see figs. 36 and 37)

Insert the thickness gauge $\varnothing = 1.3 \pm 0.05$ mm between the idle adjustment screw (7) and the control lever (6). When the upper edge of the intermediate lever roller (4) is in the position where the upper edge of the angle (8) is located, temporarily tighten the screw (5) so that it touches the control lever (6). Then turn the screw clockwise a half or a full rotation. Turn back to its previous position, and then tighten. (During this process, the intermediate lever moves clockwise across the horizontal position by 1° to 3°)

3. Setting the W-CSD (KSB) lever (see figs. 36 and 37)

Insert the thickness gauge $\varnothing = \pm 0.05$ mm between the idle adjustment screw (7) and the control lever (6), as in the diagram (fig. 38), and tighten the screw (2) in the spot where the roller of the W-CSD lever (3) touches the intermediate lever (4). (During insertion, the temperature of the wax should remain below 30°C)

Note: When inserting the thickness gauge between levers (3) and (4), using the screw (2), leave a big enough gap so that no pressure is exerted on the lever.

Calculation formula (Fig. 37)

Timing device travel:

$$\begin{array}{ll} -10 \leq t \leq 20 & \text{TA} = -0.0367 t + 1.284 \\ 20 \leq t \leq 40 & \text{TA} = -0.0275 t + 1.1 \end{array}$$

Tolerance between control lever and idle stop screw:

$$\begin{array}{ll} -10 \leq t \leq 20 & \varnothing = -0.0628 t + 2.1555 \\ 20 \leq t \leq 30 & \varnothing = -0.0507 t + 1.9142 \\ 30 \leq t \leq 50 & \varnothing = -0.0196 t + 0.9809 \end{array}$$

